

Muzeul Județean Mureș

MARISIA



Studii și materiale

XXXI

Științele Naturii

2011

MARISIA

Studii și materiale

XXXI

Științele Naturii

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MUZEUL JUDEȚEAN MUREȘ

MARISIA

STUDII ȘI MATERIALE

XXXI

ȘTIINȚELE NATURII

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2011

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BOTANY

VEGETATION ASPECTS OF THE HERGHELIA VILLAGE HILLS (MUREŞ COUNTY)

Silvia OROIAN¹, Mihaela SĂMĂRGHIȚAN²

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Abstract: This paper presents a description of vegetation from the Herghelia village area. The studied phytocenoses are situated on hilly area at 18 km north-north-west of Târgu-Mureș city and it belongs to the Ceuașul de Câmpie commune.

The identified phytocenoses were framed to Festuco-Brometea and Molinio-Arrhenatheretea classes. Two vegetal associations were identified: *Arrhenatheretum elatioris* Br.-Bl. ex Scherrer and *Thymo pannonici – Stipetum stenophyllae* Sanda et al 1998. For these grasslands flora several threatened and rare taxons were identified being included in the national and international red lists: *Adonis vernalis*, *Agrimonia pilosa*, *Prunus tenella*.

Keywords: vegetation description, grasslands, rare plants, Herghelia hills

Introduction

The overall objective of this research is to contribute to a better knowledge of the flora and vegetation of this area. The specific objectives are to investigate plant communities and assess the presence of certain endangered species in these grasslands flora.

Herghelia village is situated 18 km north-north-west of Târgu-Mureș city and it belongs to the Ceuașul de Câmpie commune, from the region known as the “Transylvanian Plain”, a much discussed toponym in the biogeographical classification.

Material and methods

In accordance with the research work performed in 2008–2010, two plant associations were identified in the area we studied, their phytocenoses being framed in Molinio-Arrhenatheretea and Festuco-Brometea classes by Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993) [11] classification system.

Observations and field researches were conducted from 2008 to 2010, during the plants vegetation period. The types of grasslands were identified, and within these, several phytosociological surveys were carried out, following the Braun-Blanquet method [6, 7]. Sample areas were selected so as to include altitudinal variations that exist within the territory. Determination of species was done on the field and in laboratory, based on the collected material, especially for difficult to identify taxa, using Flora Romania [16]. Nomenclature of species is consistent with Flora Europaea [15]. Syntaxonomic classification was based on consulting the most recent

classification papers at European level [11] and also on synthetic works developed on the vegetation of Romania [7,8,14].

Results and discussions

The deforestation of oak and hornbeam trees in Transylvania has led to the settlement of mesophilic and xerophilic phytocoenoses in the Transylvanian Plain. Two plant associations have been identified in the studied area:

MOLINIO-ARRHENATHERETEA R. Tx. 1937 em. R.Tx. 1970

ARRHENATHERETALIA R. Tx. 1931

ARRHENATHERION Koch 1926

Arrhenatheretum elatioris Br.-Bl. ex Scherrer 1925

FESTUCO – BROMETEA Br.-Bl. et R.Tx. ex Klika et Hadač 1944

BROMETALIA ERECTI Br.-Bl. 1936

CIRSIO–BRACHYPODION PINNATI Hadač et Klika in Klika et Hadač 1944

Thymo pannonici – *Stipetum stenophyllae* Sanda et al 1998

(Syn. *Stipetum stenophyllae transsilvanicum* Soó 1946 apud Soó 1947)

1. Ass. *Arrhenatheretum elatioris* Br.-Bl. Ex Scherrer 1925

The association *Arrhenatheretum elatioris* Br.-Bl. Ex Scherrer 1925 (Table 1) is found on a hillside at the altitude of 400 m s.m, with eastern exposure and a 40° slope, in the potential area of the oak and hornbeam forest, a grass edge formed by *Dictamnus albus*, *Vincetoxicum hirundinaria*, *Euphorbia epithymoides* and xerothermal vegetation islands. It is a secondary association with a heterogeneous floristic composition.

Coenoses have a very good vegetation coverage (100%), with a continuous and dense plant canopy. Along with the two dominant species, *Arrhenatherum elatius* and *Pastinaca sativa*, many species of the *Arrhenatheretalia* order are found: *Agrostis capillaris*, *Dactylis glomerata*, *Galium mollugo*, *Leucanthemum vulgare*.

The study of the **humidity** requirements of the species shows that the majority of the species are *xero-mesophilic* and, consequently, leave their mark on the character of the flora, which has moderate humidity requirements. These are followed by *mesophilic* and *xerophilic* species.

Regarding the behavior of plants in relation to **temperature**, the temperate climate determines the predominance of *micro-mesothermal* elements, followed by *moderately thermophilic* species. *Eurythermal* species are present in a significant proportion.

From the point of view of **edaphic preferences**, of the soil reaction, *weakly acid-neutrophilic* species have the highest proportion, followed by *euryionic* species. These euryionic species cannot characterize certain stations, but they participate in the creation of the ecological and coenotic environment of the plant groups. The *acid-neutrophilic* species are in accordance with the distribution of the types of soil in the studied area and with the frequent levigation phenomena of the hillside soils. *Neutro-basophilic* species also appear on the hillside (Fig. 1).

The analysis of **biological forms** is an important element in the characterization of the association, evidencing some features of the biotopes and the influence of various factors on these. The percentage distribution of the bioforms is shown by the spectrum of bioforms (Fig. 2). The high percentage of *hemicryptophytes* indicates that the studied area belongs to the temperate climate areas. The presence of *therophytes* indicates a more arid climate and a high degree of anthropic influence.

The spectrum of **phytogeographical elements** (Fig. 3) evidences the predominance of *Eurasian* species, on the background of which *European*, *Euro-Siberian* elements have interfered in various phyto-historical stages. Due to historical conditions in the postglacial period, the presence of a significant group of *Mediterranean* species is found.

In the karyological spectrum (Fig. 4), *diploid* species are dominant, followed by *polyploid* species. Part of the species are *diplo-polyploid*, and for a proportion of 1.80%, no karyological information was available. The great number of diploid species demonstrates the old age of this flora, which ensures a favorable genetic potential for the future phyto-evolution. Polyploids have a much higher capacity for phytocoenological competition.

NATURA 2000: 6210

CLAS.PAL.: 38.2

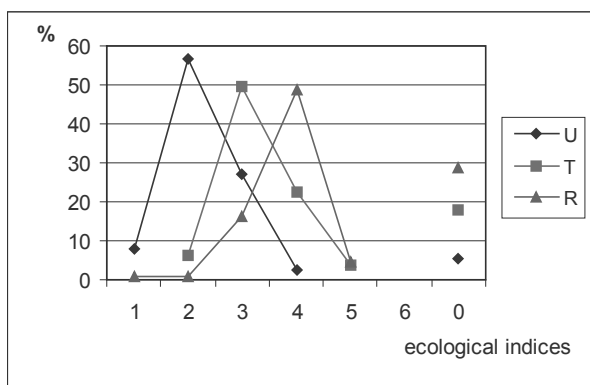


Fig. 1: Ecological indices of *Arrhenatheretum elatioris* association

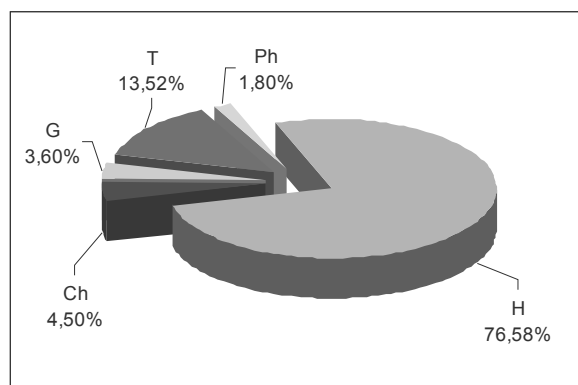


Fig. 2: Bioforms spectrum of *Arrhenatheretum elatioris* association

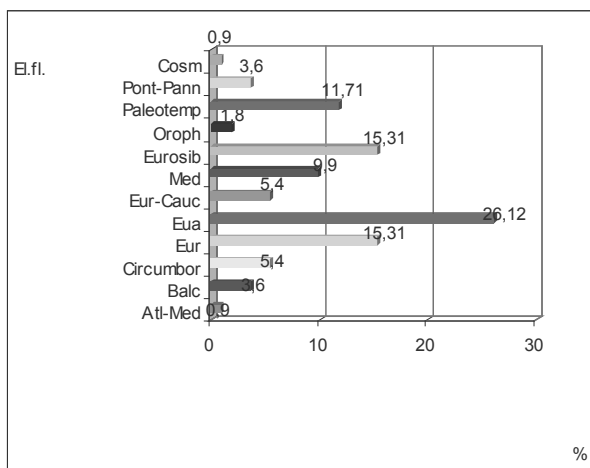


Fig. 3: Floristical elements of *Arrhenatheretum elatioris* association

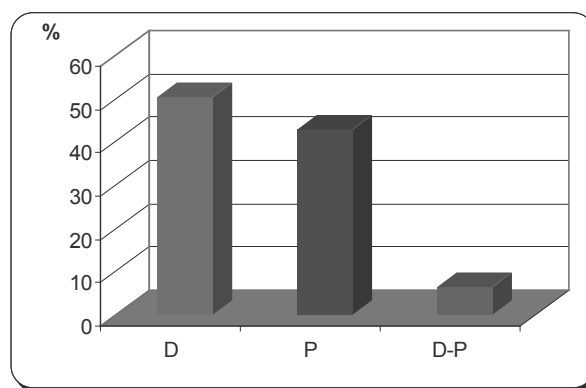


Fig. 4: Karyological spectrum of *Arrhenatheretum elatioris* association

Table 1: *Arrhenatheretum elatioris* Br.-Bl. Ex Scherrer 1925

Relevee	1	2	3	4	5	6	
Altitude (ms.m)	350	350	350	350	350	350	
Aspect	E	E	E	E	E	E	
Inclination (°)	40	40	40	40	40	5	
Area (m ²)	100	100	100	100	100	100	K
Car. ass.							
<i>Arrhenatherum elatius</i>	2	+	3	3	4	1	V
<i>D. Dictamnus albus</i>	1	1	+	+	+	—	V
<i>D. Vincetoxicum hirundinaria</i>	+	+	—	+	+	+	V
<i>D. Euphorbia epithymoides</i>	+	+	+	—	—		III
Arrhenatheretalia (incl. Molinio-Arrhenatheretea)							
<i>Agrostis capillaris</i>	+	+	+	+	+	+	V
<i>Dactylis glomerata</i>	+	+	+	1	+	+	V
<i>Galium mollugo</i>	+	+	+	+	+	+	V
<i>Leucanthemum vulgare</i>	+	+	1	+	+	+	V
<i>Ranunculus polyanthemus</i>	+	+	+	+	+	—	V
<i>Crepis biennis</i>	+	+	—	+	+	+	V
<i>Festuca rubra</i>	3	+	2	—	+	3	V
<i>Linum catharticum</i>	+	—	+	+	—	+	IV
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	—	+	—	+	+	+	IV
<i>Trisetum flavescens</i>	1	3	1	—	1	—	IV
<i>Trifolium pratense</i>	+	—	+	—	+	—	III
<i>Carum carvi</i>	—	—	+	+	—	+	III
<i>Festuca pratensis</i>	1	—	+	+	—	—	III
<i>Heracleum sphondylium</i>	—	—	—	+	+	—	II
<i>Viola tricolor</i>	—	—	+	+	—	—	II
<i>Centaureum erythraea</i>	—	—	—	—	+	+	II
<i>Stachys officinalis</i>	+	+	—	—	—	—	II
<i>Cichorium intybus</i>	—	—	+	+	—	—	II
<i>Trifolium repens</i>	—	—	—	+	—	—	I
<i>Vicia cracca</i>	—	—	—	+	—	—	I
<i>Valeriana officinalis</i>	—	—	—	+	—	—	I
<i>Symphytum officinale</i>	—	—	—	+	—	—	I
<i>Veronica chamaedrys</i>	—	—	—	—	+	—	I
<i>Prunella vulgaris</i>	+	—	—	—	—	—	I
<i>Taraxacum officinale</i> agg.	—	+	—	—	—	—	I
Cirsio-Brachypodium (incl. Brometalia erecti)							
<i>Onobrychis viciifolia</i>	1	2	+	3	3	2	V
<i>Centaurea apiculata</i> ssp. <i>spinulosa</i>	+	+	+	+	+	+	V
<i>Briza media</i>	+	+	+	+	+	+	V
<i>Polygala major</i>	+	+	+	+	—	+	V
<i>Lotus corniculatus</i>	—	—	+	+	+	+	IV
<i>Knautia arvensis</i>	—	+	—	+	+	+	IV
<i>Plantago lanceolata</i>	—	+	+	+	—	+	IV
<i>Plantago media</i>	+	—	+	+	+	—	IV
<i>Ononis arvensis</i>	+	+	—	+	—	—	III
<i>Brachypodium pinnatum</i>	—	+	—	+	+	—	III
<i>Scabiosa ochroleuca</i>	—	—	+	+	—	—	II
<i>Leontodon hispidus</i> ssp. <i>hispidus</i>	—	+	—	+	—	—	II

Festucion rupicolae							
<i>Nepeta nuda</i>	+	+	+	+	—	+	V
<i>Dorycnium pentaphyllum</i> ssp. <i>herbaceum</i>	—	—	+	+	+	+	IV
<i>Vinca herbacea</i>	+	+	+	—	—	+	IV
<i>Nonea pulla</i>	—	—	+	+	+	+	IV
<i>Anchusa barrelieri</i>	+	+	+	+	—	—	IV
<i>Jurinea mollis</i>	—	+	1	1	—	1	IV
<i>Falcaria vulgaris</i>	—	—	—	—	+	+	II
<i>Ajuga chamaeptytis</i>	—	+	—	+	—	—	II
<i>Ajuga laxmani</i>	—	—	+	+	—	—	II
<i>Phlomis tuberosa</i>	—	—	+	—	+	—	II
Festucetalia valesiacae							
<i>Cerinthe minor</i>	+	+	+	+	—	+	V
<i>Veronica teucrium</i>	+	+	+	+	+	—	V
<i>Stachys recta</i>	+	+	+	+	—	+	V
<i>Adonis vernalis</i>	+	+	+	+	—	—	IV
<i>Bupleurum falcatum</i>	—	—	+	+	+	+	IV
<i>Campanula sibirica</i>	+	—	+	+	—	+	IV
<i>Muscari tenuiflorum</i>	+	+	+	+	—	—	IV
<i>Fragaria viridis</i>	—	+	+	+	—	—	III
<i>Sanguisorba minor</i>	—	—	+	+	—	—	II
<i>Helianthemum nummularium</i>	—	—	—	+	+	—	II
<i>Festuca valesiaca</i>	—	+	—	—	—	—	I
Festuco-Brometea							
<i>Carex caryophylla</i>	+	+	+	+	+	+	V
<i>Dianthus carthusianorum</i> var. <i>saxigenus</i>	+	+	—	+	+	+	V
<i>Euphorbia cyparissias</i>	+	+	+	—	+	+	V
<i>Pimpinella saxifraga</i>	+	+	+	+	+	—	V
<i>Thymus pulegioides</i>	—	+	+	+	+	+	V
<i>Salvia verticillata</i>	+	+	—	+	+	1	V
<i>Coronilla varia</i>	—	+	+	+	+	—	IV
<i>Galium verum</i>	+	+	—	+	—	+	IV
<i>Salvia pratensis</i>	+	+	+	—	+	—	IV
<i>Stachys germanica</i>	—	+	+	+	+	—	IV
<i>Agrimonia pilosa</i>	—	—	—	+	+	+	III
<i>Filipendula vulgaris</i>	+	+	+	—	—	—	III
<i>Potentilla heptaphylla</i>	—	—	—	+	+	+	III
<i>Medicago falcata</i>	+	—	—	+	+	—	III
<i>Trifolium montanum</i>	1	3	+	—	—	—	III
<i>Erysimum odoratum</i>	—	+	+	—	—	+	III
<i>Echium vulgare</i>	—	—	—	+	+	+	III
<i>Ajuga genevensis</i>	—	+	+	+	—	—	III
<i>Teucrium chamaedrys</i>	—	—	+	+	—	+	III
<i>Hieracium pilosella</i>	—	—	+	+	—	+	III
<i>Potentilla recta</i>	+	—	—	—	+	—	II
<i>Polygala comosa</i>	—	+	+	—	—	—	II
<i>Viola hirta</i>	—	—	+	+	—	—	II
<i>Asperula cynanchica</i>	—	—	+	+	—	—	II
<i>Convolvulus arvensis</i>	—	+	+	—	—	—	II
<i>Euphrasia stricta</i>	—	—	+	—	+	—	II

<i>Veronica spicata ssp. orchidea</i>	–	–	+	–	+	–	II
<i>Orobanche alba</i>	–	+	–	–	–	+	II
<i>Achillea setacea</i>	–	–	–	+	–	+	II
<i>Salvia nemorosa</i>	–	–	–	–	+	+	II
<i>Ornithogalum umbellatum</i>	+	+	–	–	–	–	II
<i>Koeleria cristata</i>	–	–	–	+	–	+	II
<i>Phleum phleoides</i>	–	–	–	–	+	+	II
<i>Poa pratensis</i>	–	–	–	+	+	–	II
<i>Daucus carota</i>	–	–	–	+	–	–	I
Prunetalia							
<i>Crataegus monogyna</i>	+	+	–	–	–	–	II
<i>Euonymus europaea</i>	+	–	–	–	–	–	I
Variae Syntaxa							
<i>Primula elatior</i>	+	+	+	+	–	+	V
<i>Thalictrum aquilegifolium</i>	+	+	–	–	–	+	III
<i>Asarum europaeum</i>	+	+	–	–	–	–	II
<i>Clematis recta</i>	–	+	–	+	–	–	II
<i>Hypericum quadrangulum</i>	–	–	–	+	+	–	II
<i>Symphytum tuberosum</i>	+	–	+	–	–	–	II
<i>Clinopodium vulgare</i>	–	+	+	–	–	–	II
<i>Campanula persicifolia</i>	–	+	+	–	–	–	II
<i>Helleborus purpurascens</i>	–	+	–	–	–	–	I
<i>Cardaminopsis arenosa</i>	–	+	–	–	–	–	I
<i>Pulmonaria mollis ssp. mollissima</i>	–	+	–	–	–	–	I
<i>Mentha spicata</i>	–	–	–	+	–	–	I

Place and date of relevee: 1–5: Herghelia (29.05.2008), 6 – Herghelia (18.05.2010).

2. Ass. *Thymo pannonici* – *Stipetum stenophyllae* Sanda et al 1998

The coenoses of this association (Table 2) settle on limited surface areas, situated in the upper third of the western hill slope, at an altitude of 400 m s.m, with 20° inclination. The association has also been reported in the Transylvanian Plain, the surrounding areas of Blaj, Sebeșului Valley, Gușteriței Valley, and Secașelor Plateau. The steppe landscape is dominated by xeric grasslands, in the composition of which gramineae and various xerophilic dicotyledons are prevalent. The 62 species of the floristic composition have a 90% coverage. Along with the dominant species, *Stipa stenophylla* and *Thymus pannonicus*, the floristic composition includes a great number of xerophilic species characteristic of *Cirsio-Brachypodion*, *Festucetalia rupicola*, *Festucetalia valesiaca*, but the species characteristic of the *Festuco-Brometea* class are also well represented, which enhances the xerophilic character of the association. Microthermal *Prunus tenella* and *Rosa gallica* bushes are also found within the association. Several species of the *Molinio-Arrhenatheretea* class have also penetrated the coenoses.

The spectrum of **ecological indices** (Fig. 5) evidences the great number of *xero-mesophilic* (64.51%), *xerophilic* (16.12%) and 14.51% *mesophilic* species. In relation to temperature, the species are predominantly *micro-mesothermal* (40.32%), *moderately thermophilic* (35.48%), followed by *eurythermal* species (17.74%). Regarding the soil reaction, the majority of the species are *weakly acid-neutrophilic* (54.83%), *euryionic* (20.96%), *acid-neutrophilic* (19.35%), and 3.22 are *neutro-basophilic* species.

The spectrum of **bioforms** (Fig. 6) reveals the predominance of hemicryptophytic species (61.29%), with a role in coenotic cohesion, followed by therophytes (22.58%) and chamephytes (4.83%).

In terms of **floristic elements** (Fig. 7), *Eurasian* (27.41%), *European* (22.58%), *Euro-Siberian* 16.12%), *paleo-temperate* 14.51%), *Mediterranean* species (8.06%), are prevalent, followed by *circumboreal*, *orophytic* species, etc.

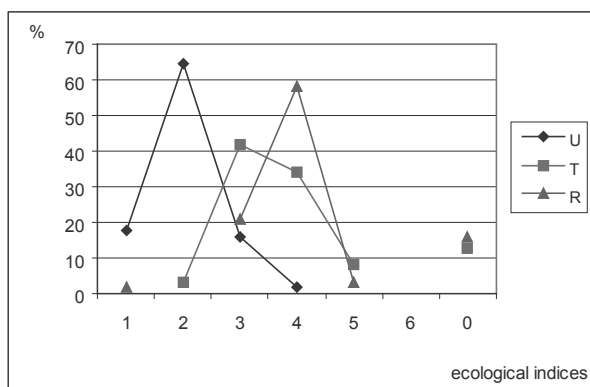


Fig. 5: Ecological indices of *Thymo pannonicum* – *Stipetum stenophyllae* association

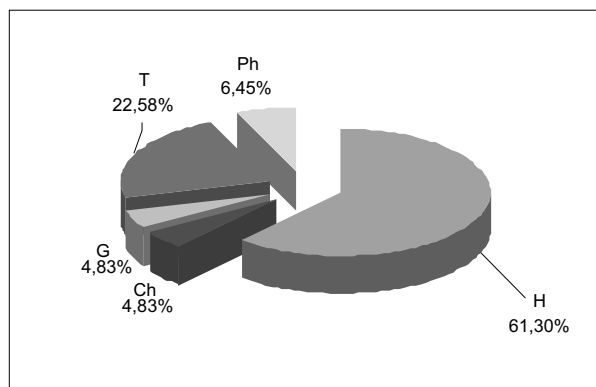


Fig. 6: Bioforms spectrum of *Thymo pannonicum* – *Stipetum stenophyllae* association

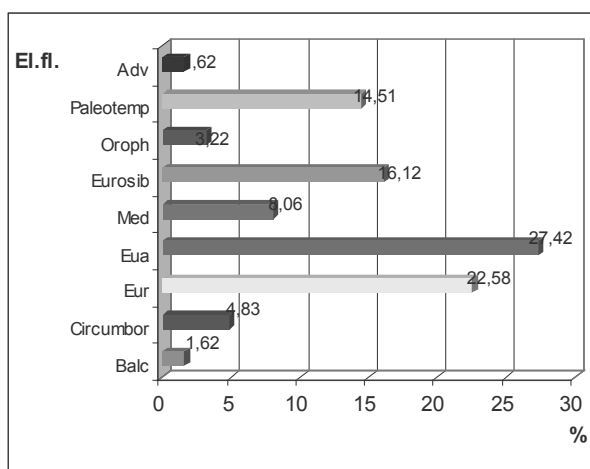


Fig. 7: Floristical elements of *Thymo pannonicum* – *Stipetum stenophyllae* association

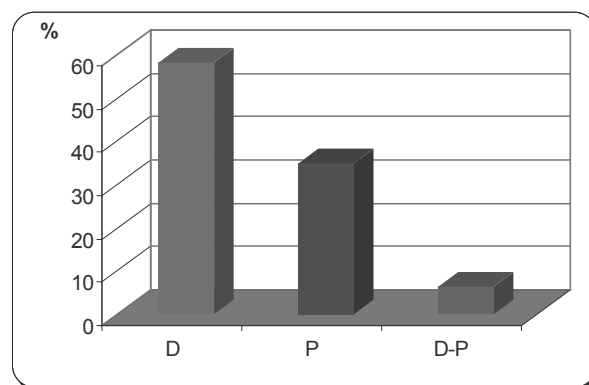


Fig. 8: Karyological spectrum of *Thymo pannonicum* – *Stipetum stenophyllae* association

In the karyological spectrum (Fig. 8), *diploid* (58.33%), *polyploid* (35%) and 6.66% *diplo-polyploid* species participate, and for 3.22%, no karyological information was available.

These grasslands with a strong steppe character, which extend on small surface areas, are relics of diluvial steppes, preserved as pastureland of the Herghelia village, being highly degraded because of the unfavorable water regime, having a low productivity and forage quality.

NATURA 2000: 6210

CLAS.PAL.: 34.31

Table. 2: *Thymo pannonici* – *Stipetum stenophyllae* Sanda et al 1998
 Syn. *Stipetum stenophyllae transsilvanicum* Soó 1946 apud Soó 1947

Relevee	1	2	3	4	5	
Altitude (ms.m)	350	350	350	350	350	
Aspect	V	V	V	V	V	
Inclination (°)	20	20	20	20	20	
Area (m²)	100	100	100	100	100	
Vegetation coverage (%)	90	90	90	90	90	K
Car. ass.						
<i>Stipa stenophylla</i>	–	–	+	+	+	III
<i>Thymus pannonicus</i>	3	3	+	2	2	V
Cirsio – Brachypodium (incl. Brometalia erecti)						
<i>Brachypodium pinnatum</i>	+	+	+	+	+	V
<i>Onobrychis viciifolia</i>	+	+	+	–	+	IV
<i>Plantago lanceolata</i>	+	+	–	+	+	IV
<i>Plantago media</i>	–	+	+	+	–	III
<i>Centaurea apiculata</i> ssp. <i>spinulosa</i>	+	+	+	–	–	III
<i>Lotus corniculatus</i>	–	–	–	+	–	I
<i>Knautia arvensis</i>	–	–	–	–	+	I
Festucion rupicolae						
<i>Astragalus monspessulanus</i>	1	1	1	2	+	V
<i>Nonea pulla</i>	–	+	+	+	+	IV
<i>Dorycnium pentaphyllum</i> ssp. <i>herbaceum</i>	–	–	2	1	2	III
<i>Oxytropis pillosa</i>	–	–	–	–	+	I
<i>Euphorbia virgata</i>	+	–	–	–	–	I
<i>Falcaria vulgaris</i>	2	–	+	–	–	II
Festucetalia valesiaca						
<i>Festuca valesiaca</i>	3	1	1	1	+	V
<i>Sanguisorba minor</i>	1	–	1	+	+	IV
<i>Cerinth minor</i>	–	+	+	+	+	IV
<i>Fragaria viridis</i>	–	+	+	–	+	III
<i>Melampyrum cristatum</i>	–	–	+	+	2	III
<i>Stachys recta</i>	–	–	+	+	+	III
<i>Bupleurum falcatum</i>	+	–	–	–	+	II
<i>Veronica teucrium</i>	–	+	+	–	–	II
<i>Campanula sibirica</i>	+	+	+	1	+	V
<i>Centaurea biebersteinii</i>	–	–	+	+	–	II
<i>Inula ensifolia</i>	+	+	–	–	–	II
<i>Muscari tenuiflorum</i>	–	–	–	+	+	II
<i>Artemisia campestris</i>	–	+	–	–	–	I
<i>Hieracium cymosum</i>	–	–	+	–	–	I
<i>Bromus japonicus</i>	+	–	–	–	–	I
<i>Elymus hispidus</i>	–	–	–	–	+	I
Festuco – Brometea						
<i>Agrimonia pilosa</i>	+	+	+	1	+	V
<i>Coronilla varia</i>	+	+	+	+	+	V
<i>Orobanch alba</i>	+	1	+	+	+	V

<i>Echium vulgare</i>	–	+	+	–	+	III
<i>Ajuga chamaeypitis</i>	–	–	+	+	+	III
<i>Salvia verticillata</i>	–	+	–	+	+	III
<i>Filipendula vulgaris</i>	+	+	–	–	–	II
<i>Potentilla argentea</i>	–	–	–	+	+	II
<i>Rosa gallica</i>	2	–	2	–	–	II
<i>Eryngium campestre</i>	–	–	–	+	+	II
<i>Veronica spicata</i> ssp. <i>orchidaea</i>	+	+	–	–	–	II
<i>Crataegus monogyna</i>	–	–	–	+	–	I
<i>Potentilla heptaphylla</i>	–	–	–	–	+	I
<i>Prunus tenella</i>	–	–	1	–	–	I
<i>Anthyllis vulneraria</i>	–	+	–	–	–	I
<i>Medicago lupulina</i>	–	–	–	–	+	I
<i>Euphorbia cyparissias</i>	–	–	–	–	+	I
<i>Hypericum perforatum</i>	–	–	–	–	+	I
<i>Galium mollugo</i>	+	–	–	–	–	I
<i>Salvia nemorosa</i>	–	–	+	–	–	I
<i>Erigeron acris</i>	+	–	–	–	–	I
<i>Rosa canina</i>	–	–	+	–	–	I
Molinio – Arrhenatheretea						
<i>Leucanthemum vulgare</i>	+	+	1	+	+	V
<i>Erigeron annuus</i>	+	+	+	–	–	III
<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	–	+	–	+	+	III
<i>Dactylis glomerata</i>	+	–	+	–	+	III
<i>Crepis biennis</i>	–	–	–	–	+	I
<i>Festuca rubra</i>	+	–	–	–	–	I
Variae Syntaxa						
<i>Euphorbia falcata</i>	–	+	+	+	–	III
<i>Lapsana communis</i>	+	–	–	–	–	I

Place and date of relevee: R1–3: Herghelia (29.05.2006); R4–5: Herghelia (18.05.2010).

For these grasslands flora, several threatened and rare taxons were identified being included in the national and international red lists: *Adonis vernalis* L., *Agrimonia pilosa* Ledeb., *Prunus tenella* Batsch.

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ASPECTE DE VEGETAȚIE DE PE DEALURILE SATULUI HERGHELIA (JUDEȚUL MUREȘ)

(rezumat)

Lucrarea prezintă vegetația din împrejurimile satului Herghelia. Fitocenozele au fost identificate în zona de deal din vecinătatea acestui sat aparținând comunei Ceuașul de Câmpie, situat la 18 km NNV de Târgu-Mureș.

Populațiile au fost încadrate în două asociații: *Arrhenatheretum elatioris* Br.-Bl. ex Scherrer și *Thymo pannonicum* – *Stipetum stenophyllae* Sanda et al. 1998, aparținând claselor Molinio-Arrhenatheretea și Festuco-Brometea.

În flora acestor pajiști au fost identificați o serie de taxoni menționați în listele roșii naționale și internaționale: *Adonis vernalis*, *Agrimonia pilosa*, *Prunus tenella*.



Fig. 9: *Astragalus monspessulanus*



Fig. 10: *Ajuga chamaeepytis*



Fig. 11: *Adonis vernalis*



Fig. 12: *Dictamnus albus*



Fig. 13: *Prunus tenella*



Fig. 14: *Oxytropis pillosa*



Fig. 15: *Phlomis tuberosa*



Fig. 16: *Leucanthemum vulgare*

ENDANGERED PLANT SPECIES IN THE FLORISTIC COMPOSITION OF THE PERENIAL TALL HERB „MEGAFORB” COMMUNITIES (MULGEDIO-ACONITETEA CLASS) IN ARGEȘ COUNTY

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Abstract: Perennial tall herb “megaforb” growing on deep winter snowy edges, along the rivers, depressions, in primary or secondary forests, on mesic and moist soils rich in organic materials. In these groups meet plant taxa with different degrees of vulnerability. This paper presents 12 species of plants classified in three categories endangered. These species are classified into 7 plant associations. Vulnerable plant species are present in these plant communities: *Gentiana punctata* L. and *Rhododendron myrtifolium* Schott *et* Kotschy. These species are included in associations: *Hyperico grisebachii-Calamagrostetum villosae* Pawlowski *et* Walas 1949 and *Trisetum fuscum* – *Salicetum hastatae* Coldea (1986) 1990. Species are classified sozological groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation. The system of preventive, protective and biotechnological methods of rare phytocenoses protection is proposed. Rare phytocenoses promote the conservation of vegetation biodiversity and support the phylogenetic process in the phytobiosphere.

Keywords: flora, sozological categories, IUCN Red List, Argeș county, plant associations, Bern Convention, Habitats Directive.

Introduction

The information from the literature and personal researches in the field, shown the existence of 2009 species and subspecies in the Argeș County. All these systematic categories belong to 584 genera and 144 botanical families. It are included in neither categories of the Red List, 309 species and subspecies being distributed by the following categories: rare, vulnerable, endemic to Romania, endemic to Romania not endangered, species having rare European specific spreading area, having endangered European specific spreading area (IUCN Red List, Habitats Directive Annex IIb, IVb and Bern Convention – App I).

For main sozological categories we made a presentation and integration chorology coenotic to indicate how to save and protect endangered species.

Materials and methods

The establishment of the protected plants was made on the basis: *Red List of extinct endangered, vulnerable and rare higher plants of Romania flora* (Boșcaiu N., Coldea Gh., Horeanu Cl., 1994), *Rare vulnerable and endemic plants of Romania flora – The Red List* (Dihoru Gh., Dihoru Alexandrina, 1994), *The Red List of higher plants of Romania flora* (Oltean M., Negrean

G., Popescu A., Roman N., Dihoru G., Sanda V., Mihăilescu S., 1994), *Critical list of vascular plants in Romania*, (Oprea A., 2005), *Arges county cormoflora* (Alexiu V., 2008), *Red book of vascular plants in Romania* (Dihoru G., Negrean G., 2009).

The World Conservation Union (International Union for Nature Conservation) IUCN introduced a classification of threats (*IUCN Red list categories*, 1994). Extinct and probably extinct taxa may be classified among one of two categories: extinct (**EX**) or extinct in the wild (**EW**). A group of taxa at high risk of extinction represents critically endangered (**CR**), endangered (**EN**) and vulnerable (**VU**) categories. Also the lower risk category (**LR**) has been distinguished, or not threatened (**NT**). Species, for which it is difficult to determine the degree of threat for lack of adequate information, have temporarily been classified among the data deficient category (**DD**). The classification of species among particular categories is based on detailed and quantitative criteria (*IUCN Red list categories*, 1994).

Protection of endangered plants is through international agreements. The most important agreement is *Convention on the Conservation of European Wildlife and Natural Habitats*, adopted in Bern in 1979. This agreement regulates how the protection of wild flora and fauna and their habitats. Another international agreement, concluded between Member States, aims at the identification, designation and conservation of areas that require protection for species and habitats (*habitats Directive*, adopted in Brussels in 1992–92/43/EEC).

Results

- 12 species were identified, falling into 7 plant associations:

MULGEDIO-ACONITETEA Hadač et Klika in Klika 1948

ADENOSTYLETALIA ALLIARIAE Br.-Bl. 1931

Adenostylion alliariae Br.-Bl. 1925

- *Cirsio waldsteinii* – *Heracleetum transsilvanici* Pawl. et Walas 1949
 - *Heracleum sphondylium* L. subsp. *transsilvanicum* (Schur) Brummitt (LC)
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai (LC)
 - *Adenostyles alliariae* (Gouan) A. Kerner subsp. *hybrida* (DC.) Tutin (NT)
 - *Leucanthemum waldsteinii* (Schultz-Bip.) Pouzar (NT)
- *Adenostylo-Doronicetum austriaci* Horvat 1956
 - *Heracleum sphondylium* L. subsp. *transsilvanicum* (Schur) Brummitt (LC)
 - *Tozzia alpina* L. subsp. *carpatica* (Woloszczac) Hayek (NT)
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai (LC)
 - *Adenostyles alliariae* (Gouan) A. Kerner subsp. *hybrida* (DC.) Tutin (NT)
 - *Leucanthemum waldsteinii* (Schultz-Bip.) Pouzar (NT)
 - *Poa granitica* Br.-Bl. subsp. *disparilis* (E.I. Nyárády) E.I. Nyárády (NT)
- *Aconietum taurici* Borza 1934 ex Coldea 1990
 - *Heracleum sphondylium* L. subsp. *transsilvanicum* (Schur) Brummitt (LC)
 - *Adenostyles alliariae* (Gouan) A. Kerner subsp. *hybrida* (DC.) Tutin (NT)
 - *Leucanthemum waldsteinii* (Schultz-Bip.) Pouzar (NT)
- *Salici* – *Alnetum viridis* Colic et al. 1962
 - *Ranunculus carpaticus* Herbich (NT)
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai (LC)
 - *Adenostyles alliariae* (Gouan) A. Kerner subsp. *hybrida* (DC.) Tutin (NT)
 - *Leucanthemum waldsteinii* (Schultz-Bip.) Pouzar (NT)
 - *Trisetum fuscum* (Kit. ex Schultes) Schultes (NT)

Calamagrostion villosae Pawlowski et al. 1928

- *Hyperico grisebachii-Calamagrostetum villosae* Pawlowski et Walas 1949
 - *Gentiana punctata* L. (VU)
- *Trisetum fuscum – Salicetum hastatae* Coldea (1986) 1990
 - *Salix hastata* L. (NT)
 - *Rhododendron myrtifolium* Schott et Kotschy (VU)
 - *Campanula patula* L. subsp. *abietina* (Griseb.) Simonkai (LC)
 - *Adenostyles alliariae* (Gouan) A. Kerner subsp. *hybrida* (DC.) Tutin (NT)
 - *Leucanthemum waldsteinii* (Schultz-Bip.) Pouzar (NT)
 - *Trisetum fuscum* (Kit. ex Schultes) Schultes (NT)
- *Diantho compacti-Festucetum porcii* Nyárady 1966
 - *Dianthus barbatus* L. subsp. *compactus* (Kit.) Heuff. (NT)

Conclusions

- The 12 species are classified in three sozological categories:

LC	VU	NT
2	2	8

- Vulnerable species are: *Gentiana punctata* L. and *Rhododendron myrtifolium* Schott et Kotschy
- Species with low risk of vulnerability are: *Heracleum sphondylium* L. subsp. *transsilvanicum* (Schur) Brummitt and *Campanula patula* L. subsp. *abietina*.
- Weight species associations is as follows:

<i>Adenostylo – Doronicetum austriaci</i>	6
<i>Trisetum fuscum – Salicetum hastatae</i>	6
<i>Salici – Alnetum viridis</i>	5
<i>Cirsio waldsteinii – Heracleetum transsilvanici</i>	4
<i>Aconietum taurici</i>	3
<i>Hyperico grisebachii – Calamagrostetum villosae</i>	1
<i>Diantho compacti – Festucetum porcii</i>	1

- Plant associations with vulnerable taxa:
 - *Hyperico grisebachii-Calamagrostetum villosae* Pawlowski et Walas 1949
 - *Trisetum fuscum – Salicetum hastatae* Coldea (1986) 1990

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SPECII DE PLANTE PERICLITATE DIN COMPOZIȚIA FLORISTICĂ A COMUNITĂȚILOR DE BURUIENIȘURI ÎNALTE DE MUNTE – „MEGAFORBIETE” (CLASA MULGEDIO-ACONITETEA) ÎN JUDEȚUL ARGEȘ

(rezumat)

Buruienișurile înalte de munte, megaforbițe, vegetează în locuri cu multă zăpadă pe timpul iernii, de-a lungul râurilor, în depresiuni, în păduri primare sau secundare, pe soluri cu umiditate mare, bogate în substanțe organice. În aceste grupări se găsesc specii de plante încadrate în diferite grade de vulnerabilitate. Lucrarea prezintă 12 specii de plante clasificate în trei categorii sozologice. Speciile încadrate în diferite categorii sozologice au fost stabilite pe diferite criterii, cum ar fi: rata de declin, mărimea populației, zona de distribuție geografică, gradul de fragmentare al populației, distribuția. Aceste specii sunt încadrate în 7 asociații vegetale. Speciile de plante vulnerabile, prezente în aceste asociații, sunt: *Gentiana punctata* L. și *Rhododendron myrtifolium* Schott et Kotschy. Aceste specii sunt incluse în asociațiile. *Hyperico grisebachii* – *Calamagrostetum villosae* Pawlowski et Walas 1949 și *Trisetum fuscii* – *Salicetum hastatae* Coldea (1986) 1990. Cunoscând care sunt speciile periclitare și încadrarea lor fitocenotică, se pot propune diferite mijloace de prevenire, protecție și conservare a biodiversității aceluia tip de vegetație și a speciilor cu diferite grade de vulnerabilitate, susținerea proceselor de fitocenogeneză în fitobiosferă.

A NEW STATION FOR *FRITILLARIA MELEAGRIS* L. IN MUREȘ COUNTY

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Abstract: This study is presenting a new station for *Fritillaria meleagris* L. in Mureș County. The phytocoenoses were identified in Grăușorul village, about 28 km far away from Tg-Mureș.

According to Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993) and Gh. Coldea (1991) the *Fritillaria meleagris* populations were framed in *Calamagrostio-Salicetum cinereae* Soó et Zólyomi in Soó 1955 association. The association was ecological, chorological, on base of the floristically composition and caryological analyzed.

Keywords: Grăușor, *Fritillaria meleagris*, new station, vegetation description.

Introduction

Fritillaria meleagris populations were found near the village Grăușorul belonging to the Vărgata commune. The village is situated on the middle course of the Niraj River, about 28 km from the city of Târgu-Mureș and about 30 km from Reghin.

The study area is located in the region called Hills of Niraj, along the Niraj River. Flora of this area is characterized by a great diversity of plant taxa due to the interaction of the relief, climate and soil.

By geographical location, Niraj River basin falls in the temperate continental climate with an average annual temperature of 8.8 °C and annual average precipitation of 615.4 mm/m². This type of climate is an important parameter in determining the floristic diversity of the area.

In terms of geography, this region is characterised by the hilly topography specific to the Transylvanian Plateau, with extended heights with altitudes that generally not exceed 600 m,



Fig. 1: Location of Grăușor Village

and large valleys with soften slopes, sometimes steep. The level differences between meadows and peaks that guard the river basin exceed 220 m, reaching up to 260 m.

In the approximately NNE-SSW direction, the area is crossed by the main watercourse, Niraj River and its main tributary, Nirajul Mare River.

On the territory of the Vărgata commune, the sub-mountainous area of the Niraj River is found, characterized by strong course of the Nirajul Mare River, carrying gravel, and downstream, starting from its confluence with the Nirajul Mic River from the Miercurea Niraj, occurs a spectacular transition to the appearance of lower river, with a gentle flow to a large meadow, which exceeds in some places even the width of the Mureș River valley, of which is tributary. On this territory, the Nirajul Mare River valley widens gradually from 500–800 m to about 2 kilometers on the Niraj River valley.

From the geological point of view, the area meet to date only Pannonian age formations, represented by gray clay marls with thin grit or sand intercalations and within fine and medium sand with marl-grit intercalations. The thickness of clay layers is of hundreds of meters on the slopes, and on the main valley bottom, under a low permeable blanket of sandy-clay powder is a porous pack of layers of gravel with sand and boulders, representing the alluvium deposited by Niraj River. The thickness of these layers increases from upstream to downstream.

Material and methods

This research is based on field observation. The main method of study was the most frequent and appreciable of Montpellier School, the Braun-Blanquet method.

In accordance with the research work performed in 2004 and 2010, a new station for *Fritillaria meleagris* species was identified in the Mureș county. According to Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993) [10] and Gh. Coldea (1991) [3] classification system, the *Fritillaria meleagris* populations were framed in *Calamagrostio-Salicetum cinereae* Soó et Zólyomi in Soó 1955 association.

For this association, territorial spreading, floristical composition, biological structure, phytogeographic elements and ecological behavior correlated with plants' needs for humidity, temperature and soil pH are mentioned in the paper. A diploid and polyploid species graphic distribution was made as well.

Nomenclature of species is consistent with Flora Europaea [20, 21]. Systematic classification of taxa was made according to Code of Botanical Nomenclature, 1995 [25]. Syntaxonomic classification was based on consulting the most recent classification papers at European level [10, 11] and also on synthetic works developed on the vegetation of Romania [5, 15].

The habitat types are coded according to Interpretation Manual of Natura 2000 Romanian habitats, developed and printed in Romania under the PHARE project „Implementation of NATURA 2000 in Romania” [6] and according to Habitats in Romania [5].

Results and discussions

Despite the continental character of this valley, all excess water during spring caused the formation of a meso-hydrophilic vegetation.

The phytocoenoses with *Salix cinerea* and *Fritillaria meleagris* are framed to the Alnetea glutinosae class by the classification system envisaged by the authors: Ladislav Mucina, Georg Grabherr, Thomas Ellmauer (1993) and Gh. Coldea (1991):

ALNETEA GLUTINOSAE Br.-Bl.et R.Tx.ex Westhoff et al.1946

Salicetalia auritae Doing 1962

Salicion cinereae T.Müller et Görs 1958

Calamagrostio-Salicetum cinereae Soó et Zólyomi in Soó 1955

Although in the investigated area we found no *Calamagrostis canescens* population, and neither the floristic literature has reported this species in the Vărgata commune area, considerations related to synchorology have led us to report *Salix cinerea* coenoses in the association described by Soó and Zólyomi (1955).

Most of the clumps of *Salix cinerea* have a subrecent origin, by their development on sites where, following deforestation of hornbeam oakery, the physiological drainage has ceased and the groundwater has increased. Similarly, such clusters also continue to grow on the meadows belonging to the Molinietalia order, where, due to groundwater raising, the hay exploitation has ceased.

The correspondence between habitat type in the classification system used at European level and Romanian level is:

R4419 – Tufărişuri sud-est carpatice de zălog (*Salix cinerea*) cu *Calamagrostis canescens* (East Carpathian grey willow-carrs with *Calamagrostis canescens*)

Correspondences:

NATURA 2000: –

EMERALD: 44. Temperate riverine and swamp forests and brush

CORINE: 44.921 Grey willow scrub

PAL.HAB 1999: 44.9213 Intra-Carpathian grey wilow-carrs

EUNIS: F9.213 Intra-Carpathian grey wilow-carrs

The composition of the analyzed groups (Table 1) are distinguished by a large number of transgressive species of Molinio-Arrhenatheretea class (*Filipendula ulmaria*, *Sanguisorba officinalis*, *Lychnis flos-cuculi*, etc.), as well as of the Calthion alliance (*Caltha palustris* ssp. *laeta*, *Myosotis scorpioides*). A remarkable number of hygrophilic species is also met (*Lysimachia nummularia*, *Ranunculus repens*).

The phytocoenoses of this association are predominantly mesophilic (44.74%) and mesohygrophilic (27.63%), micro-mesothermal (55.26%) and euriionic (39.47%) (Fig. 2).

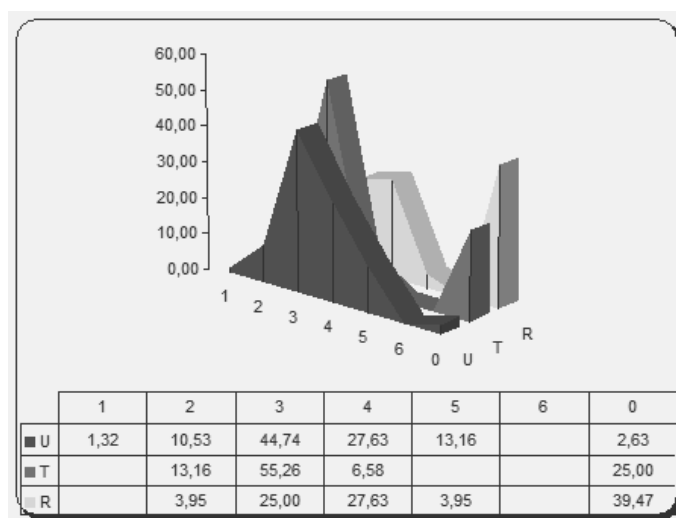


Fig. 2: Ecological parameters of *Calamagrostio-Salicetum cinereae* association

Of the bioforms spectrum (Fig. 3), one can see the predominance of the hemicryptophytes (60.53%), followed by geophytes (14.47%). The significant presence of the terophytes (10.53%) is due to anthropogenic pressures exerted on these phytocoenoses. Phanerophytes (9.21%) are also present in considerable numbers.

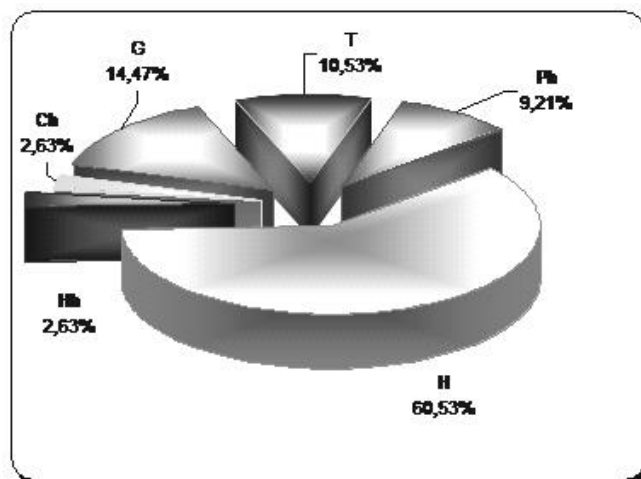


Fig. 3: Bioforms spectrum of *Calamagrostio-Salicetum cinereae* association

The chorological analysis of this association (Fig. 4) shows that Eurasian element is predominant (26.32%), followed by European element (13.16%), Circumboreal (11.84%), Eurosiberian, European-Caucasian and Paleotemperate (10.53%). Under the influence of anthropogenic factors subcosmopolite populations expanded (7.89%).

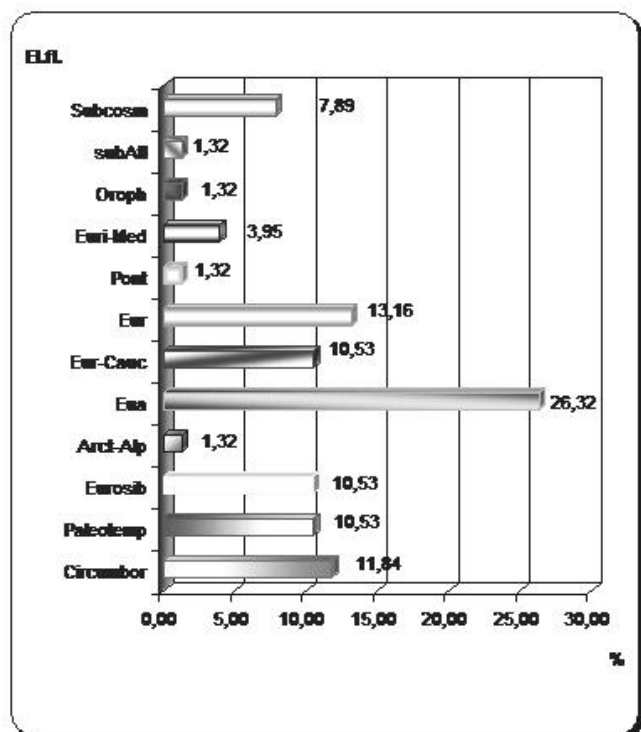


Fig. 4: Floristical elements of *Calamagrostio-Salicetum cinereae* association

Of the total species that make up the phytocoenoses of this association, 45.45% are polyploid, 44.16% are diploid and 9.09% diploid-polyploid (Fig. 5). The diploid index has the value of 0.965.

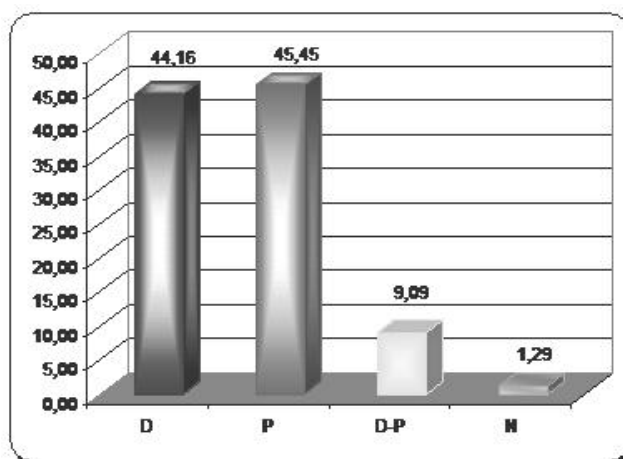


Fig. 5: Caryological spectrum of *Calamagrostio-Salicetum cinereae* association

In the case of hedges of *Calamagrostio-Salicetum cinereae* the frequencies of the types of pollination and dispersal of diaspores have values comparable to those of the alder small forests of Alno-Ulmion alliance (Querco-Fagetea class). Being located in open spaces, both anemogamy and anemochory occur at high frequencies.

In all the phytocoenoses of this association, entomophilic and anemophilic species are predominant. Self-pollinated species associated with anemophilic and apogamic species appear with erratic frequencies.

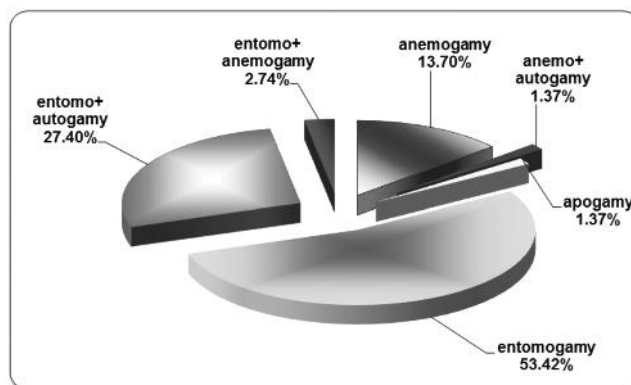


Fig. 6: Pollination types of species of *Calamagrostio-Salicetum cinereae* association

Zoochory and anemochory have a predominant role in propagating diaspores. Because of high groundwater levels, mirmecochory occurs with lower frequencies, but hydrochory has higher frequencies instead (Fig. 7).

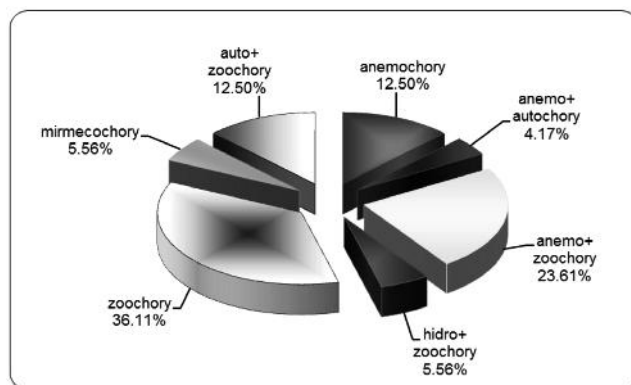


Fig. 7: Diaspores dispersion of species of *Calamagrostio-Salicetum cinereae* association

According to the Red List for extinct, endangered and rare vascular plants of the Romanian flora (N. Boșcaiu, Gh. Coldea, C. Horeanu, 1994), some components of the Grăușor flora are also at various stages of endangerment.

Of the vulnerable species (V) present in the Niraj Valley flora are: *Narcissus radiiflorus* Salisb. (European threatened species) and *Fritillaria meleagris* L.

In the Red List of vascular plants of Romania (M. Olteanu, G. Negrean, A. Popescu, N. Roman, G. Dihoru, V. Sanda, S. Mihăilescu, 1994) several species are endangered, vulnerable, rare and endemic, of which *Fritillaria meleagris* L., *Narcissus radiiflorus* Salisb. were reported in the study area.

Of the endangered species list established by the *Convention on the Conservation of Wildlife and Natural Habitats*, the Council of Europe (1998), and adopted in the framework of the Emerald Program, *Narcissus radiiflorus* Salisb. is present in the investigated area.

Table 1: *Calamagrostio-Salicetum cinereae* Soó et Zólyomi in Soó 1955

Relevee	1	2	3	4	5	6	7	8	
Altitude	430	430	430	430	430	430	430	430	
Area m ²	25	100	100	100	100	25	100	100	
Vegetation coverage (%)	80	100	75	90	85	100	60	100	K
Alno-Ulmion									
<i>Salix cinerea</i>	4	4	4	4	4	+	1	+	V
<i>Humulus lupulus</i>	—	+	+	+	+	—	—	—	III
<i>Lysimachia nummularia</i>	+	+	—	—	+	+	+	—	IV
<i>Ribes nigrum</i>	+	+	+	—	—	—	—	—	II
<i>Sambucus nigra</i>	—	—	+	—	—	—	—	—	I
<i>Thalictrum lucidum</i>	—	—	—	—	—	+	—	—	I
<i>Viburnum opulus</i>	—	+	—	—	—	—	+	—	II
Calthion									
<i>Caltha palustris ssp. laeta</i>	—	—	—	+	—	—	+	—	II
<i>Fritillaria meleagris</i>	+	1	+	+	2	1	3	3	V
<i>Geum rivale</i>	+	+	—	+	—	—	—	—	II
<i>Juncus articulatus</i>	—	—	+	—	—	—	—	+	II
<i>Myosotis scorpioides</i>	—	+	—	—	—	—	—	—	I
<i>Polygonum bistorta</i>	1	+	—	2	+	+	+	+	V
Molinion									
<i>Cnidium dubium</i>	+	+	+	—	—	+	—	—	III
<i>Colchicum autumnale</i>	—	+	—	—	—	1	+	—	II
<i>Deschampsia caespitosa</i>	—	—	—	—	—	+	+	4	II
<i>Linum catharticum</i>	—	—	+	—	—	+	—	—	II
<i>Narcissus radiiflorus</i>	—	+	+	—	—	+	+	—	III
<i>Sanguisorba officinalis</i>	—	+	+	+	—	3	+	—	IV
<i>Stachys officinalis</i>	—	+	—	—	—	+	—	—	II
<i>Symphytum officinale</i>	—	—	—	—	—	+	—	—	I
<i>Veratrum album</i>	+	—	—	—	+	+	—	+	III
Molinio-Arrhenatheretea									
<i>Achillea millefolium</i>	—	+	—	—	—	+	+	+	III
<i>Ajuga reptans</i>	+	+	+	+	+	1	+	—	V
<i>Anthoxanthum odoratum</i>	—	—	—	—	—	+	—	—	I

<i>Cardamine pratensis</i>	+	+	+	+	—	+	+	—	IV
<i>Cerastium holosteoides</i>	+	—	—	—	—	—	+	—	II
<i>Cirsium oleraceum</i>	—	—	—	+	—	+	—	—	II
<i>Filipendula ulmaria</i>	+	+	+	+	+	3	+	—	V
<i>Galium mollugo</i>	—	—	—	+	—	+	—	—	II
<i>Heracleum sphondylium</i>	—	—	—	—	+	—	—	—	I
<i>Lathyrus pratensis</i>	—	—	—	—	—	+	+	—	II
<i>Luzula campestris</i>	—	—	—	—	—	+	+	—	II
<i>Lychnis flos-cuculi</i>	+	+	—	—	—	—	—	—	II
<i>Prunella vulgaris</i>	—	—	—	—	—	—	+	—	I
<i>Ranunculus acris</i>	—	—	—	—	—	—	+	—	I
<i>Ranunculus repens</i>	—	—	+	—	+	+	+	—	III
<i>Rumex acetosa</i>	—	—	—	—	—	+	+	—	II
<i>Trifolium repens</i>	—	—	—	—	—	—	+	—	I
<i>Valeriana officinalis</i>	—	+	+	+	—	+	+	—	IV
Phragmitetalia									
<i>Carex vulpina</i>	—	—	—	+	—	—	—	—	I
<i>Iris pseudacorus</i>	—	—	+	+	—	—	+	—	II
<i>Phragmites australis</i>	—	+	—	—	—	—	—	—	I
<i>Scirpus sylvaticus</i>	—	+	—	—	—	—	—	—	I
<i>Solanum dulcamara</i>	—	+	—	—	—	—	—	—	I
Festuco-Brometea									
<i>Dianthus carthusianorum</i>	—	—	—	—	—	—	+	—	I
<i>Erophila verna</i>	—	—	—	—	—	—	+	—	I
<i>Pimpinella saxifraga</i>	—	—	—	—	—	—	+	—	I
<i>Thalictrum minus</i>	+	—	—	—	—	—	—	—	I
<i>Veronica teucrium</i>	—	—	—	—	—	+	+	—	II
Querco-Fagetea									
<i>Acer campestre</i>	—	+	—	—	—	—	—	—	I
<i>Aegopodium podagraria</i>	—	+	+	+	—	—	—	—	II
<i>Alliaria petiolata</i>	+	—	+	—	—	+	—	—	II
<i>Anemone nemorosa</i>	—	+	—	—	+	—	—	—	II
<i>Cornus sanguinea</i>	+	—	+	—	—	—	—	—	II
<i>Glechoma hirsuta</i>	—	+	—	—	+	—	—	—	II
<i>Leucojum vernum</i>	—	—	+	+	+	—	+	—	III
<i>Listera ovata</i>	—	—	—	+	—	—	—	—	I
<i>Phleum pratense</i>	—	—	—	—	—	+	—	—	I
<i>Polygonatum multiflorum</i>	—	+	—	—	—	—	—	—	I
<i>Prunus avium</i>	—	+	+	+	—	—	—	—	II
<i>Ranunculus auricomus</i>	1	2	+	+	—	+	+	—	IV
<i>Ranunculus ficaria</i>	—	—	—	—	+	—	+	—	II
<i>Rosa canina</i>	+	—	—	—	—	—	+	—	II
Scheutzerio-Caricetea fuscae									
<i>Pedicularis palustris</i>	—	—	—	+	—	+	—	—	II
Convolvuletalia									
<i>Galium aparine</i>	+	+	+	—	+	—	—	—	III

Variae syntaxa									
<i>Barbarea vulgaris</i>	–	–	–	–	–	–	+	–	I
<i>Carex nigra</i>	–	–	+	+	+	2	+	+	IV
<i>Cruciata glabra</i>	–	–	–	+	–	+	–	–	II
<i>Cruciata laevipes</i>	–	–	–	–	–	–	+	–	I
<i>Dipsacus fullonum</i>	–	–	–	–	–	–	+	–	I
<i>Epilobium palustre</i>	–	–	–	–	–	+	–	–	I
<i>Galium palustre</i>	–	–	–	–	–	+	–	–	I
<i>Lamium amplexicaule</i>	–	–	–	–	+	–	–	–	I
<i>Potentilla anserina</i>	–	–	–	–	–	–	+	–	I
<i>Stellaria uliginosa</i>	+	–	–	–	–	–	–	–	I
<i>Veronica becabunga</i>	–	–	–	–	–	–	+	–	I

Place and date of relevee:

GRÂUȘOR: N 46°36' E 24° 50'

25.04.2004 (1–4), 17.04.2004 (5), 25.04.2004 (6), 17.04.2010 (7–8).

Conclusions

The identified phytocoenoses were reported to *Calamagrostio-Salicetum cinereae* Soó et Zólyomi in Soó 1955 association.

Given that in studied area were identified some consistent population of *Fritillaria meleagris* and *Narcissus radiiflorus*, endangered plants with botanical interest, it is recommended to monitor it and reduce the human impact in the area in order for these beauties of the flora of Mureș county to be saved and preserved.

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O NOUĂ STAȚIUNE PENTRU *FRITILLARIA MELEAGRIS* L. ÎN JUDEȚUL MUREȘ

(rezumat)

Lucrarea prezintă o nouă stațiune pentru *Fritillaria meleagris* în județul Mureș. Fitocenozele au fost identificate pe teritoriul satului Grăușor, comuna Vărgata, la 28 de km distanță de Târgu-Mureș. Populațiile au fost încadrate în asociația *Calamagrostio-Salicetum cinereae* Soó et Zólyomi în Soó 1955. Asociația este caracterizată din punct de vedere al preferințelor ecologice ale speciilor componente, a compoziției în bioforme, corologic și cariologic.

Au fost, de asemenea, identificați o serie de taxoni aflați în diverse stadii de periclitate, incluși în listele roșii naționale și internaționale.



Fig. 8: *Calamagrostio-Salicetum cinereae* association in Grăușor village



Fig. 9: *Fritillaria meleagris*



Fig. 10: Human impact in studied area (burned vegetation)

MACROMYCETES FROM THE AGARICALES ORDER AMONG THE “GHEORGHE SĂLĂGEANU” COLLECTION OF TÂRGU-MUREȘ NATURAL SCIENCE MUSEUM (I)

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Abstract: This work presents a part of the “Gheorghe Sălăgeanu” collection which belongs to the Herbarium of Natural Science Museum from Târgu-Mureș. The 92 taxons of macromycetes from the Agaricales order belong to 6 families: Agaricaceae, Amanitaceae, Bolbitiaceae, Coprinaceae, Entolomataceae, Hygrophoraceae.

For each taxons the scientific name was indicated, as well as the collecting location, date, the biological form, the edibility or the toxicity point of view (by conventional signs), the number of patrimony belongings registered in the inventory “Plante inferioare”, of Natural Science Museum from Târgu-Mureș and not least, the number of specimens.

The collection has an important value, first of all, because it emphasizes a part of the patrimony of our museum, secondly, due to the fact that it completes the knowledge concerning the ecology and chorology of some macromycetes from Romania and finally, because of the antiquity of some species (for more than half a century) and the collector’s notoriousness.

One of the species presented here, *Hygrocybe calyptriformis* is threatened on European level.

Keywords: mycetoepixilophyta, mycetoendoxilophyta, mycetogeophyta mycorrhiza, mycetogeophyta saprophytica, mycetotherophyta.

Introduction

In 2005, the Herbarium of the Natural Science Museum from Târgu-Mureș has enriched with a new collection, bought from Professor Gheorghe Sălăgeanu. It contains 650 species of macromycetes. These represent almost half of the species ever found in Romania. The macromycetes are represented by fruit-bodies in different forms and colours, preserved by drying. The species were stipulated in “*Determinator pentru recunoașterea ciupercilor comestibile, necomestibile și otrăvitoare din România*”, which issued in 1985, at the Ceres Publishing House winning a Romanian Academy prize as the best contribution in this research field.

The biolog Gheorghe Sălăgeanu worked with “Ovidius” University Constanța, Natural Science Department. He was the dean of the Superior Educational Institute Constanța, between 1976–1984. He is the author of numerous botanical works, one of them being “*Rezervații, monumente și frumuseți ale naturii din județul Constanța*”, edited by the Natural Science Complex, Constanța, in 1978 and more than 60 other articles which are concerning the same scientific field. He was member of the European Society of Mapping Macromycetes, in the Romanian Biological Sciences Society and in the Romanian Commission of the Nature Monuments from Constanța.

This work completes the knowledge regarding the ecology and chorology of some macro-mycetes from Romania.

Materials and methods

The work represents a part of the collection, meaning 92 taxons of macromycetes, belonging to 6 families from the Agaricales order: Agaricaceae, Amanitaceae, Bolbitiaceae, Coprinaceae, Entolomataceae, Hygrophoraceae (Fig. 1).

The 314 patrimony belongings, were collected and assigned by Gheorghe Sălăgeanu.

The specific nomenclature and the systematical classification of species were achieved according to the *Cybernome, the Nomenclator for Fungi and their Associated Organisms* and Kirk (2010) in the *Index fungorum – Species fungorum* [6, 7].

The biological forms, the edibility or toxicity degree and the phenophases were made according to Sălăgeanu & Sălăgeanu (1985) (Table 1).

For each taxons, the scientific name was indicated, as well as the collecting location, date, the biological form, the edibility or the toxicity point of view (by conventional signs), the number of patrimony belongings, registered in the inventory “Plante inferioare”, of Natural Science Museum from Târgu-Mureș and not least, the number of specimens.

Results and discussions

The taxonomical diversity of the macromycetes from “Gheorghe Sălăgeanu” collection was finalized through the identification among the Agaricales order, during a first stage, of 92 taxons (88 species and 4 infraspecific taxons – varieties), belonging to 6 families and 19 genres, all founded in the following districts from Romania: Alba, Bihor, Bistrița-Năsăud, Cluj, Maramureș, Sălaj and Tulcea, collected between 1956–1968 and in 1977 (Table 2).

According to Sălăgeanu & Sălăgeanu (1985), the taxons are part of these biological forms:

- mycetoepixilophyta (EPx) = 3 taxons;
- mycetoendoxilophyta (Ex) = 1 taxon;
- mycetogeophyta mycorrhiza (Gm) = 30 taxons;
- mycetogeophyta saprophytica (Gs) = 47 taxons;
- mycetotherophyta (Th) = 10 taxons.

At those mentioned above, there can be supplemented an intermediar form, mycetogeophyta saprophytica – mycetoepibryophyta (Gs – EPbr).

One of the species presented here, *Hygrocybe calyptriformis* is threatened on European level.

List of collecting sites

Alba district: Apuseni Mountains: Detunata, Arieșului Valley.

Bihor district: Vadul Crișului.

Bistrița Năsăud district: Rodnei Mountains: Vinului Valley, Corongiș Peak, Ineuș Peak, Popii Hill.

Cluj district: Cluj-Napoca: Gheorgheni, Craiului Hill (Mănăstur), Galicer Hill, Dealul Hoia, Fântâna lui Bilașcu, Botanical Garden, Babeș Park, Hoia Forest, Lomb Forest, Someșul Mic; Călățele; Negru Hill; Făgetul Clujului, Someșul Cald; Peana Peak; Plecica Valley; Mount Vlădeasa: Pietrele Albe, Răcadului Valley; Gilăului Mountains: Băișoara, Buscat Peak.

Maramureș district: Baia Mare; Șomcuta Mare.

Sălaj district: Năpradea, Traniș, Vădurele.

Tulcea district: Dobrogea, Babadag.

Table 1: The taxonomical conspect of macromycetes from the above mentioned families, with the confining of the biological forms and phenophases.

Regnum, phylum, class, order	Family	Species	Bioform	Phenophase
Fungi Basidiomycota Basidiomycetes Agaricales	Agaricaceae	<i>Agaricus arvensis</i>	Gs	V–X
		<i>Agaricus augustus</i>	Gs	VIII–X
		<i>Agaricus bitorquis</i>	Gs	V–IX
		<i>Agaricus campestris</i>	Gs	V–X
		<i>Agaricus silvaticus</i>	Gs	VII–X
		<i>Agaricus xanthodermus</i>	Gs	VII–X
		<i>Lepiota acutesquamosa</i>	Gs	IX–X
		<i>Lepiota castanea</i>	Gs	VII–IX
		<i>Lepiota clypeolaria</i>	Gs	VIII–X
		<i>Lepiota cristata</i>	Gs	VII–X
		<i>Lepiota erminea</i>	Gs	IX–XI
		<i>Lepiota seminuda</i>	Gs	VIII–X
		<i>Leucoagaricus leucothites</i>	Gs	IX–XI
		<i>Leucocoprinus luteus</i>	Gs	II–XII
		<i>Macrolepiota excoriata</i>	Gs	VIII–X
		<i>Macrolepiota mastoidea</i>	Gs	IX–X
		<i>Macrolepiota procera</i>	Gs	VII–X
		<i>Macrolepiota puellaris</i>	Gs	VIII–IX
		<i>Macrolepiota rachodes</i>	Gs	VII–X
	Amanitaceae	<i>Amanita caesarea</i>	Gm	VII
		<i>Amanita citrina</i>	Gm	VIII–XI
		<i>Amanita fulva</i>	Gm	VIII–IX
		<i>Amanita inaurata</i>	Gm	VI–VII
		<i>Amanita muscaria</i>	Gm	VII–XI
		<i>Amanita ovoidea</i>	Gm	VII–IX
		<i>Amanita pantherina</i>	Gm	VII–X
		<i>Amanita phalloides</i>	Gm	VII–X
		<i>Amanita porphyria</i>	Gm	VII–X
		<i>Amanita regalis</i>	Gm	VII–IX
		<i>Amanita rubescens</i>	Gm	VI–X
		<i>Amanita strobiliformis</i>	Gm	VII–IX
		<i>Amanita vaginata</i>	Gm	VI–X
		<i>Amanita vaginata var. grisea</i>	Gm	VI–X
		<i>Amanita vaginata var. nivalis</i>	Gm	VI–X
		<i>Amanita vittadinii</i>	Gm	VII–VIII
	Bolbitiaceae	<i>Agrocybe dura</i>	Gs	VIII–IX
		<i>Agrocybe erebia</i>	Gs	VII–X
		<i>Agrocybe paludosa</i>	Gs	VII–X
		<i>Agrocybe pediades</i>	Gs	VIII–X
		<i>Agrocybe praecox</i>	Gs	V–VII
		<i>Agrocybe semiorbicularis</i>	Gs	VII–IX
		<i>Bolbitius aleuriatus</i>	Th	VII–X
		<i>Bolbitius vitellinus</i>	Th	V–IX
		<i>Bolbitius vitellinus var. fragilis</i>	Th	V–IX
		<i>Bolbitius vitellinus var. titubans</i>	Th	V–IX
		<i>Conocybe tenera</i>	Th	V–XI
		<i>Pholiotina togularis</i>	Gs	VIII–X

Regnum, phylum, class, order	Family	Species	Bioform	Phenophase
Fungi Basidiomycota Basidiomycetes Agaricales	Coprinaceae	<i>Coprinus atramentarius</i>	Th	V–XI
		<i>Coprinus comatus</i>	Th	IV–XI
		<i>Coprinus disseminatus</i>	Th	V–X
		<i>Coprinus micaceus</i>	Th	V–XI
		<i>Coprinus picaceus</i>	Th	VII–X
		<i>Lacrymaria lacrymabunda</i>	Gs	VII–X
		<i>Psathyrella caput-medusae</i>	EPx	VIII–X
		<i>Psathyrella gracilis</i>	Gs	VI–VIII
		<i>Psathyrella piluliformis</i>	EPx	VIII–XI
		<i>Psathyrella populina</i>	EPx	IX–X
		<i>Psathyrella spadicea</i>	Ex	VIII–XI
	Entolomataceae	<i>Clitopilus prunulus</i>	Gs	VI–X
		<i>Entoloma rhodopolium</i>	Gs	VIII–X
		<i>Entoloma sinuatum</i>	Gs	V–IX
		<i>Rhodocybe mundula</i>	Gs	X–XI
		<i>Rhodocybe nitellina</i>	Gs	VIII–IX
		<i>Rhodocybe truncata</i>	Gs	VIII–IX
		<i>Rhodophyllus clandestinus</i>	Gs	IX–XII
		<i>Rhodophyllus chyeatus</i>	Gs	V–VI
		<i>Rhodophyllus lazulinus</i>	Gs	IX–XI
		<i>Rhodophyllus mammosus</i>	Gs	VII–XI
		<i>Rhodophyllus parkensis</i>	Gs	VI–IX
		<i>Rhodophyllus staurosporus</i>	Gs – EPbr	IV–X
	Hygrophoraceae	<i>Hygrocybe calyptriformis</i>	Gs	VIII–X
		<i>Hygrocybe chlorophana</i>	Gs	IX–X
		<i>Hygrocybe conica</i>	Gs	VI–X
		<i>Hygrocybe irrigata</i>	Gs	VIII–IX
		<i>Hygrocybe nigrescens</i>	Gs	VIII–X
		<i>Hygrocybe psittacina</i>	Gs	IX–X
		<i>Hygrocybe punicea</i>	Gs	VIII–X
		<i>Hygrocybe virginea</i>	Gs	X–XII
		<i>Hygrophorus agathosmus</i>	Gm	IX–X
		<i>Hygrophorus arbustivus</i>	Gm	IX–X
		<i>Hygrophorus chrysaspis</i>	Gm	VIII–X
		<i>Hygrophorus chrysodon</i>	Gm	VIII–XI
		<i>Hygrophorus cossus</i>	Gm	VIII–X
		<i>Hygrophorus eburneus</i>	Gm	IX–XI
		<i>Hygrophorus hypothejus</i>	Gm	IX–III
		<i>Hygrophorus leucophaeus</i>	Gm	IX–XI
		<i>Hygrophorus olivaceoalbus</i>	Gm	VIII–XI
		<i>Hygrophorus penarius</i>	Gm	IX–X
		<i>Hygrophorus persoonii</i>	Gm	VIII–XI
		<i>Hygrophorus pudorinus</i>	Gm	VIII–X
		<i>Hygrophorus pustulatus</i>	Gm	IX–X
		<i>Hygrophorus russula</i>	Gm	VIII–X

Table 2: The numerological report of the studied taxonomical cathegories.

Agaricales	Number of families	Number of genres	Number of taxons
	6	19	92

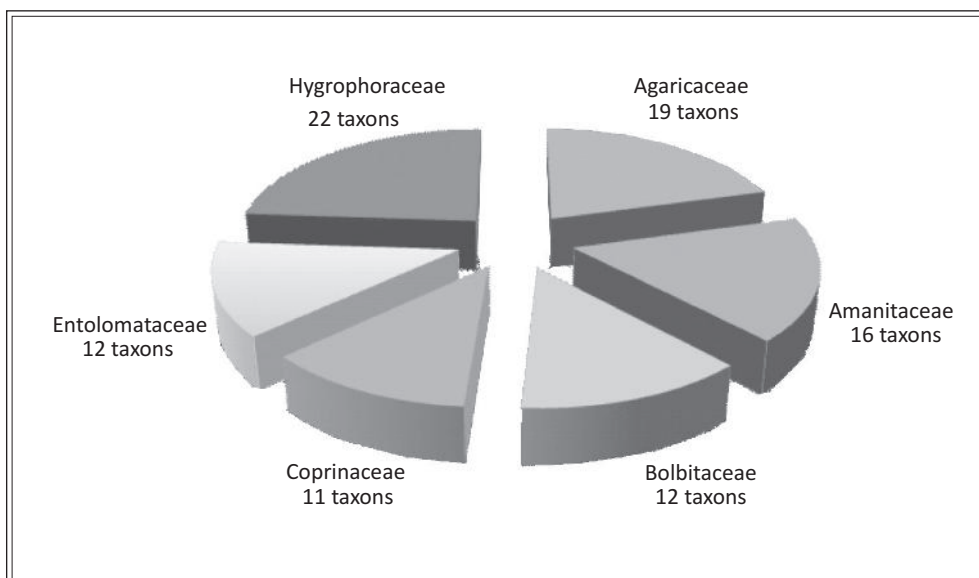


Fig. 1: The distribution into families of macromycetes.

The taxa list (in their families alphabetical order):

Fam. Agaricaceae

***Agaricus arvensis* Schaeff. apud L. Secretan (1833)**

Alba district: on the soil, in the meadows, shruberies and at the edges of the forests, at Detunata from Apuseni Mountains; 29 IX 1967; Gs; ; HMş 826 under *Agaricus arvensis* Schff. ex Fr., *Psaliota arvensis* Kumm. (syn.); 1 ex.

***Agaricus augustus* Fr. (1838)**

Cluj district: on the soil with a thick layer of fallen spruce tree leaves, in the Botanical Garden from Cluj-Napoca; 19 VIII 1962; Gs; ; HMş 825 under *Psaliota augusta* Quél. (syn.); 2 ex.

***Agaricus bitorquis* (Quél.) Sacc. (1887)**

Cluj district: in the parks and gardens from Cluj-Napoca; 28 VI 1962; Gs; ; HMş 821 under *Agaricus edulis* Vitt., *Psaliota bitorquis* Quél. (syn.); 2 ex.

***Agaricus campestris* Fr. (1821)**

Cluj district: on the composts, in the meadows, at Făget, nearby Cluj-Napoca; 8 VI 1962; Gs; ; HMş 822 under *Agaricus campestris* (L.) Fr., *Psaliota campestris* (L. ex Fr.) Kumm. (syn.); 2 ex.

***Agaricus silvaticus* Schaeff. apud L. Secretan (1833)**

Cluj district: on the soil with a layer of the fallen spruce tree leaves, in the coniferous forests from Gilăului Mountains, at Băişoara; 25 VIII 1964; Gs; ; HMş 823 under *Agaricus silvaticus* Schff. ex Secr., *Psaliota silvatica* Kumm. (syn.); 2 ex.

***Agaricus xanthodermus* Genev. (1876)**

Cluj district: in the grassy places, in the parks and gardens from Cluj-Napoca; 13 X 1960; Gs; +; HMş 824 under *Psaliota xanthoderma* Richon et Roze (syn.); 6 ex.

***Lepiota acutesquamosa* (Weinm.) P. Kumm. (1871)**

Bistrița-Năsăud district: on the soil of the deciduous and coniferous forests from Rodnei Mountains, at Vinului Valley, under Ineuț Peak; 19 IX 1963; Gs; HMş 833 under *Lepiota acutesquamosa* (Weinm.) Kumm., *Agaricus acutesquamosus* Weinm. (syn.); 1 ex.

***Lepiota castanea* Quél. (1881)**

Bistrița-Năsăud district: on the soil of the coniferous forests, at Vinului Valley, in the grassy places, at the edge of the forests; 25 VIII 1964; Gs; HMș 835; 2 ex.

***Lepiota clypeolaria* (Bull.) P. Kumm. (1871)**

Bistrița-Năsăud district: on the soil of the deciduous and coniferous forests from Rodnei Mountains, at Vinului Valley; 25 VIII 1964; Gs; ; HMș 837 under *Lepiota clypeolaria* (Bull. ex Fr.) Kumm., *Agaricus clypeolaris* Bull. ex Fr. (syn.); 1 ex.

***Lepiota cristata* (Bolton) P. Kumm. (1871)**

Cluj district: on the soil of the shrubbery, deciduous forests, clearings and grassy places, at Făgetul Clujului; 18 X 1964; Gs; HMș 834 under *Lepiota cristata* (A. et S. ex Fr.) Kumm., *Agaricus cristatus* A. et S. ex Fr. (syn.); 4 ex.

***Lepiota erminea* (Fr.) Gillet (1874)**

Cluj district: on the soil, on Craiului Hill from Mănăstur, at Cluj-Napoca; 30 VIII 1957; Gs; HMș 836 under *Lepiota erminea* (Fr.) Gill.; 3 ex.

***Lepiota seminuda* (Lasch) P. Kumm. (1871)**

Bistrița-Năsăud district: on the soil of the deciduous and coniferous forests from Rodnei Mountains, at Vinului Valley; 29 VIII 1964; Gs; HMș 832 under *Lepiota seminuda* (Lasch) Kumm., *Agaricus seminudus* Lasch (syn.); 4 ex.

***Leucoagaricus leucothites* (Vittad.) Wasser (1977)**

Cluj district: in the grassy places from the meadows, at Cluj-Napoca, Făget and on Hoia Hill; 4-5 IX 1964; Gs; HMș 1071 under *Leucoagaricus pudicus* (Bull.) Mas., *Lepiota naucina* (Fr.) Kumm., *Lepiota pudica* (Bull.) Quél. (syn.); 1 ex.

***Leucocoprinus luteus* (Bolton) Locq.**

Cluj district: in the greenhouses, on the soil from flower pots, in Botanical Garden from Cluj-Napoca; 13 XII 1965; Gs; HMș 1070 under *Leucocoprinus luteus* (Sow. ex Fr.) Locq., *Agaricus luteus* Sow. ex Fr. (syn.); 4 ex.

***Macrolepiota excoriata* (Schaeff.) Wasser (1978)**

Alba district: in the grassy places, at the edge of the forests, at Detunata from Apuseni Mountains; 29 IX 1967; Gs; ; HMș 830 under *Macrolepiota excoriata* (Schff. ex Fr.) Sing., *Agaricus excoriatus* Schff. ex Fr., *Lepiota excoriata* Kumm. (syn.); 2 ex.

***Macrolepiota mastoidea* (Fr.) Singer (1948)**

Tulcea district: on the soil of the deciduous forests from Babadag, Dobrogea; 29 IX 1962; Gs; ; HMș 831 under *Macrolepiota mastoidea* (Fr.) Sing., *Lepiota mastoidea* (Fr.) Kumm. (syn.); 1 ex.

***Macrolepiota procera* (Scop.) Singer (1948)**

Cluj district: on the sandy soils, in the grassy places from the deciduous forests, in the shrubbery, at Făgetul Clujului; 30 IX 1959; Gs; ; HMș 827 under *Macrolepiota procera* (Scop. ex Fr.) Sing., *Agaricus procerus* Scop. ex Fr., *Lepiota procera* Kumm. (syn.); 1 ex.

***Macrolepiota puellaris* (Fr.) M.M. Moser (1967)**

Cluj district: on the soil of the coniferous forests from Mount Vlădeasa, at Răcadului Valley; 29 IX 1962; Gs; HMș 829 under *Macrolepiota puellaris* (Fr.) Mos., *Lepiota puellaris* Fr. (syn.); 4 ex.

***Macrolepiota rhacodes* (Vittad.) Singer (1948)**

Bistrița-Năsăud district: on the sandy soils, with a rich forest skirt, in the deciduous and coniferous forests from Rodnei Mountains, at Vinului Valley; 29 VIII 1964; Gs; ; HMș 828 under *Macrolepiota rhacodes* (Vitt.) Sing., *Agaricus rhacodes* Vitt., *Lepiota rhacodes* Quél. (syn.); 1 ex.

Fam. Amanitaceae

***Amanita caesarea* (Scop.) Pers.**

Maramureş district: on the sandy soils, in the deciduous forests of *Quercus*, at Şomcuta Mare and Baia Mare; 2 VII 1967; Gm; ; HMş 804 under *Amanita caesarea* (Scop. ex Fr.) Pers. ex Schw., *Agaricus caesareus* Scop. ex Fr. (syn.); 4 ex.

***Amanita citrina* (Schaeff.) Gray (1821)**

Cluj district: on the soil of the deciduous forests, at Făget, nearby Cluj-Napoca; 23 IX 1962; Gm; +; HMş 810 under *Amanita citrina* (Schff.) S.F. Gray, *Agaricus citrinus* Schff. (syn.); 2 ex.

***Amanita fulva* (Schaeff.) Fr.**

Cluj district: in the deciduous forests, at Făgetul Clujului; 21 VIII 1960; Gm; HMş 803 under *Amanita fulva* (Schff. ex Fr.) Pers., *Agaricus fulvus* Schff. ex Fr. (syn.); 2 ex.

***Amanita inaurata* Gillet (1874)**

Cluj district: on the soil of the deciduous forests, at Făgetul Clujului; 30 VI 1959; Gm; HMş 799 under *Amanita inaurata* Secr., *Agaricus strangulatus* Fr., *Amanita strangulata* (Fr.) Quél. (syn.); 1 ex.

***Amanita muscaria* (L.) Hook. (1821)**

Bistriţa-Năsăud: on the soil of the deciduous and coniferous forests, especially under *Betula*, from Rodnei Mountains, at Vinului Valley; 20 VIII 1959; Gm; ++; HMş 805 under *Amanita muscaria* (L. ex Fr.) Hooker, *Agaricus muscarius* L. ex Fr. (syn.); 2 ex.

***Amanita ovoidea* (Bull.) Quél.**

Bistriţa-Năsăud district: on the limestone soils, in the forests under Corongiş Peak, from Rodnei Mountains; 27 VIII 1958; Gm; ; HMş 808 under *Amanita ovoidea* (Bull. ex Fr.) Quél.; 1 ex.

***Amanita pantherina* (DC.) Secr. (1833)**

Sălaj district: on the soil of the deciduous forests, under *Quercus*, at Traniş and Vădurele, nearby Jibou; without collecting data; Gm; ++; HMş 807 under *Amanita pantherina* (DC. ex Fr.) Secr., *Agaricus pantherinus* DC. ex Fr. (syn.); 4 ex.

***Amanita phalloides* (Fr.) Secr. (1833)**

Bistriţa-Năsăud district: on the soil of the deciduous and coniferous forests from Rodnei Mountains, at Vinului Valley, on Popii Hill; 16 VII 1962; Gm; +++; HMş 809 under *Amanita phalloides* (Vaill. ex Fr.) Secr., *Agaricus phalloides* Vaill. ex Fr. (syn.); 4 ex.

***Amanita porphyria* Alb. & Schwein.**

Cluj district: on the soil of the coniferous forests from Gilăului Mountains, at Băişoara, under Buscat Peak, under *Picea*; 1 VII 1962; Gm; +; HMş 811 under *Amanita porphyria* (A. et S. ex Fr.) Secr., *Agaricus porphyrius* A. et S. (syn.); 1 ex.

***Amanita regalis* (Fr.) Michael**

Alba district: in the meadows, at the edges of the deciduous and coniferous forest, at Detunata from Apuseni Mountains; 20 IX 1968; Gm; ++; HMş 806 under *Amanita regalis* (Fr.) Mre., *Agaricus regalis* Fr. (syn.); 4 ex.

***Amanita rubescens* Pers.**

Bistriţa-Năsăud district: on the soil of the deciduous and coniferous forests from Rodnei Mountains, at Vinului Valley; 7 VIII 1959; Gm; ; HMş 814 under *Amanita rubescens* (Pers. ex Fr.) S. F. Gray, *Agaricus rubescens* Pers. ex Fr. (syn.); 1 ex.

***Amanita strobiliformis* (Paulet) Quél.**

Cluj district: on the limestone soils, in the deciduous forests, at Făget, under Peana Peak, nearby Cluj-Napoca; 20 IX 1962; Gm; ; HMş 813 under *Amanita strobiliformis* (Vitt.) Quél., *Amanita solitaria* (Bull. ex Fr.) Quél. (syn.); 1 ex.

***Amanita vaginata* (Bull.) Vittad. (1783)**

Cluj district: on the soil of the deciduous forests, at Făget, nearby Cluj-Napoca; 1 VIII 1962; Gm; +; HMș 800 under *Amanita vaginata* (Bull. ex Fr.) Quél., *Agaricus vaginatus* Bull. ex Fr. (syn.); 2 ex.

***Amanita vaginata* var. *grisea* (DC.) Quél. & Bataille**

Cluj district: at the edges of Molhașul de la Călățele; 23 VIII 1966; Gm; +; HMș 802 under *Amanita vaginata* (Bull. ex Fr.) Vitt. var. *grisea* Quél., 2 ex.

***Amanita vaginata* var. *nivalis* (Grev.) J.-E. Gilbert (1918)**

Cluj district: on the soil of the deciduous forests, especially quercetes, on Hoia Hill from Cluj-Napoca; 5 IV 1956; Gm; +; HMș 801 under *Amanita vaginata* (Bull. ex Fr.) Vitt. var. *nivalis* Quél.; 2 ex.

***Amanita vittadinii* (Moretti) Vittad.**

Cluj district: among weeds, with *Carduus*, at Plecica Valley, nearby Cluj-Napoca; 12 VIII 1961; Gm; HMș 812 under *Amanita vittadinii* (Mor.) Vitt.; 1 ex.

Fam. Bolbitiaceae

***Agrocybe dura* (Bolton) Singer**

Cluj district: in the cultivated and plowing lands, at the edges of Lomb Forest, nearby Cluj-Napoca; 16 VI 1961; Gs; HMș 863 under *Agrocybe dura* (Bolt. ex Fr.) Sing., *Agaricus durus* Bolt. ex Fr. (syn.); 1 ex.

***Agrocybe erebia* (Fr.) Kühner ex Singer**

Cluj district: in the forests, near the roads and paths, at Făget, nearby Cluj-Napoca; 24 VIII 1959; Gs; ☉; HMș 862 under *Agrocybe erebia* (Fr.) Kühn., *Agaricus erebius* Fr., *Pholiota erebia* (Fr.) Quél. (syn.); 6 ex.

***Agrocybe paludosa* (J.E. Lange) Kühner**

Cluj district: on the swampy lands with *Carex*, at Făget, nearby Cluj-Napoca; 24 VIII 1968; Gs; HMș 865 under *Agrocybe paludosa* (Lge.) Kühn. et Romagn., *Agaricus sphaleromorpha* Bull. (syn.); 4 ex.

***Agrocybe pediades* (Fr.) Fayod**

Cluj district: on the sandy soils, in meadows with moss, at Făget, nearby Cluj-Napoca; 16 VII 1963; Gs; ☉; HMș 861 under *Agrocybe pediades* (Pers. ex Fr.) Fay., *Agaricus pediades* Pers. ex Fr., *Naucoria pediades* Quél. (syn.); 2 ex.

***Agrocybe praecox* (Pers.) Fayod (1889)**

Cluj district: on the soil of the forests, in the meadows and cultivated lands, at Cluj-Napoca; 17 VI 1959; Gs; ☉; HMș 864 under *Agrocybe praecox* (Pers. ex Fr.) Fay., *Agaricus praecox* Pers. ex Fr., *Pholiota praecox* Quél. (syn.); 6 ex.

***Agrocybe semiorbicularis* (Bull.) Singer**

Cluj district: in the meadows and cultivated lands, in Gheorgheni district, at Cluj-Napoca; 29 VIII 1968; Gs; ☉; HMș 860 under *Agrocybe semiorbicularis* (Bull. ex Fr.) Fay., *Agaricus semiorbicularis* Bull. ex Fr. (syn.); 2 ex.

***Bolbitius aleuriatus* (Fr.) Singer (1951)**

Cluj district: on the decaying deciduous trees, at Făgetul Clujului; 12 VI 1959; Th; HMș 857 under *Bolbitius aleuriatus* (Fr.) Sing. var. *reticulatus* Pers. ex Fr.; 1 ex.

***Bolbitius vitellinus* (Pers.) Fr. (1838)**

Cluj district: on the composts, in the meadows, at Făget, nearby Cluj-Napoca; 11 VII 1968; Th; HMș 854 under *Agaricus vitellinus* Pers. (syn.); 2 ex.

***Bolbitius vitellinus* var. *fragilis* (L.) J. Favre (1948)**

Cluj district: on the wet soil, in the meadows, at Someșul Cald, nearby Gilău; 1 VI 1962; Th; HMș 856 under *Bolbitius vitellinus* (Pers.) Fr. var. *fragilis* L. ex Fr.; 1 ex.

***Bolbitius vitellinus* var. *titubans* (Bull.) M. Moser ex M. Bon & R. Cortecuisse (1987)**

Cluj district: on the decaying plants, at Popii Valley, nearby Cluj-Napoca; 1 VI 1960; Th; HMș 855 under *Bolbitius vitellinus* (Pers.) Fr. var. *titubans* Bull. ex Fr.; 4 ex.

***Conocybe tenera* (Schaeff.) Kühner (1935)**

Cluj district: in the meadows and cultivated places, in the Babeș Park from Cluj-Napoca; 26 V 1968; Th; HMș 858 under *Conocybe tenera* (Schff. ex Fr.) Kühn., *Agaricus tener* Schff. ex Fr. (syn.); 4 ex.

***Pholiotina togularis* (Bull.) Fayod**

Cluj district: on the soil from the grassy places, under Hoia Forest, in the Someșului Mic waterside, at Cluj-Napoca; 18 X 1956; Gs; HMș 859 under *Pholiotina togularis* (Bull. ex Fr.) Fay.; 4 ex.

Fam. Coprinaceae

***Coprinus atramentarius* (Bull.) Fr. (1838)**

Cluj district: in big clusters, on the soil of gardens, grassy places and at the edges of the roads, at Cluj-Napoca; 19 X 1963; Th; +; HMș 840 under *Coprinus atramentarius* (Bull. ex Fr.) Fr., *Agaricus atramentarius* Bull. ex Fr. (syn.); 5 ex.

***Coprinus comatus* (O.F. Müll.) Gray (1821)**

Cluj district: in the manured and cultivated places, in parks and gardens, at Cluj-Napoca; 2 X 1963; Th; ☉☉☉☉☉; HMș 839 under *Coprinus comatus* (Müll. ex Fr.) S.F. Gray, *Agaricus comatus* Müll. in Fl. Dan ex Fr. (syn.); 2 ex.

***Coprinus disseminatus* (Pers.) Gray (1821)**

Cluj district: on the decaying plants, among moss, in orchards and gardens, at Cluj-Napoca; without collecting data; Th; HMș 838 under *Coprinus disseminatus* (Pers. ex Fr.) S. F. Gray, *Psathyrella disseminatus* (Pers. ex Fr.) Kühn. (syn.); 5 ex.

***Coprinus micaceus* (Bull.) Fr. (1838)**

Cluj district: in big clusters, on the decaying trees and plants, in Hoia Forest, at Cluj-Napoca; 27 X 1958; Th; HMș 842 under *Coprinus micaceus* (Bull. ex Fr.) Fr., *Agaricus micaceus* Bull. ex Fr. (syn.); 6 ex.

***Coprinus picaceus* (Bull.) Fr.**

Bihor district: on the soil with a thick layer of decaying leaves, in the deciduous forests, at Vadul Crișului; 27 X 1964; Th; HMș 841 under *Agaricus picaceus* Bull. (syn.); 1 ex.

***Lacrymaria lacrymabunda* (Bull.) Pat. (1887)**

Cluj district: in big clusters, in the deciduous forests, in Hoia Forest, at Cluj-Napoca; 5 VIII 1957; Gs; ☉; HMș 848 under *Psathyrella velutina* (Pers. ex Fr.) Sing., *Agaricus velutinus* Pers. ex Fr., *Lacrymaria velutina* Konr. et Maubl. (syn.); 10 ex.

***Psathyrella caput-medusae* (Fr.) Konrad & Maubl.**

Cluj district: on the decaying Picea tree, in the coniferous forests from Gilăului Mountains, at Băișoara, under Buscat Peak; 4 X 1962; EPx; HMș 849 under *Psathyrella caput-medusae* (Fr.) Konr. et Maubl., *Agaricus caput-medusae* Fr. (syn.); 3 ex.

***Psathyrella gracilis* (Fr.) Quél. (1872)**

Cluj district: on the soil of the deciduous forests, at Plecica Valley, nearby Cluj-Napoca; 2 VIII 1965; Gs; HMș 852; 1 ex.

***Psathyrella piluliformis* (Bull.) P.D. Orton (1969)**

Cluj district: in big clusters jointed through the leg base, on the decaying tree, at Făget, nearby Cluj-Napoca; 2 X 1963; EPx; ; HMș 853 under *Psathyrella hydrophila* (Bull. ex Mérat) Mre., *Agaricus hydrophylla* Bull. ex Mérat (syn.); 3 ex.

***Psathyrella populina* (Britzelm.) Kits van Wav.**

Cluj district: on the decaying *Populus tremula* tree, at Plecica Valley, nearby Cluj-Napoca; 25 XI 1964; EPx; HMș 850 under *Psathyrella silvestris* (Gill.) Moser; *Hypholoma silvestris* Gill, *Agaricus populinus* Britz. (syn.); 6 ex.

***Psathyrella spadicea* (Schaeff.) Singer (1951)**

Cluj district: at the base of beech trees trunks, at Someșul Cald, nearby Gilău; 29 VIII 1960; Ex; ; HMș 851 under *Psathyrella spadicea* (Schff. ex Fr.) Sing., *Agaricus spadiceus* Schff. ex Fr. (syn.); 2 ex.

Fam. Entolomataceae

***Clitopilus prunulus* (Scop.) P. Kumm.**

Bistrița-Năsăud district: on the soil of the deciduous and coniferous forests from Rodnei Mountains, under Ineuț Peak; 19 IX 1963; Gs;   ; HMș 796 under *Clitopilus prunulus* (Scop. ex Fr.) Kumm., *Agaricus prunulus* Scop. ex Fr. (syn.); 4 ex.

***Entoloma rhodopolium* (Fr.) P. Kumm (1871)**

Cluj district: on the soil of the deciduous forests, at Făget, nearby Cluj-Napoca; 2 IX 1961; Gs; +; HMș 946 under *Rhodophyllus nidorosus* (Fr.) Quél.; 3 ex.

***Entoloma sinuatum* (Bull.) P. Kumm. (1871)**

Cluj district: on the soil of the deciduous forests, at Făget, nearby Cluj-Napoca; 29 VIII 1960; Gs; ++; HMș 945 under *Rhodophyllus lividus* (Bull. ex Mérat) Quél., *Entoloma lividus* Quél., *Entoloma sinuatum* Quél. (syn.); 1 ex.

***Rhodocybe mundula* (Lasch) Singer apud Babos, Bohus, Loczmándi & Vasas**

Cluj district: in the deciduous forests, especially oak forests, at Cluj-Napoca, on Galicer Hill; 15 VII 1958; Gs; HMș 793 under *Rhodocybe mundula* (Lasch) Sing., *Clitopilus mundulus* Gill., *Agaricus mundulus* Lasch (syn.); 2 ex.

***Rhodocybe nitellina* (Fr.) Singer (1946)**

Bistrița-Năsăud district: on the soil of the coniferous forests from Rodnei Mountains, under Corongiș Peak, among moss; 21 IX 1956; Gs; HMș 795 under *Rhodocybe nitellina* (Fr.) Sing.; 4 ex.

***Rhodocybe truncata* (Schaeff.) Singer**

Bistrița-Năsăud district: on the soil of the coniferous forests from Rodnei Mountains, under Corongiș Peak; 28 VIII 1964; Gs;  ; HMș 794 under *Rhodocybe truncata* (Schff. ex Fr.) Sing., *Rhodopaxilus truncatus* R. Mre., *Hebeloma truncata* Kumm. (syn.); 5 ex.

***Rhodophyllus clandestinus* (Fr.) Quél.**

Cluj district: in the shrubbery and meadows, at Făget; 9 VI 1957; Gs; HMș 948; 1 ex.

***Rhodophyllus clypeatus* (L.) Quél.**

Cluj district: on the soil of gardens and orchards, under fruit-trees (*Prunus*), at Cluj-Napoca; 7 V 1956; Gs;  ; *Rhodophyllus clypeatus* (L. ex Fr.) Quél., HMș 944 under *Agaricus clypeatus* L. ex Fr., *Entoloma clypeatum* Quél. (syn.); 6 ex.

***Rhodophyllus lazulinus* (Fr.) Quél.**

Alba district: in the mountain meadows, at Detunata from Apuseni Mountains; 20 IX 1968; Gs; HMș 947 under *Agaricus lazulinus* Fr. (syn.); 8 ex.

***Rhodophyllus mammosus* (L.) Quél.**

Cluj district: in the meadows, at Făgetul Clujului, nearby Cluj-Napoca; 30 VIII 1958; Gs; HMş 949 under *Rhodophyllus mammosus* (Fr.) Quél, *Agaricus mammosus* L. ex Fr., *Nolanea mammosa* Quél. (syn.); 4 ex.

***Rhodophyllus parkensis* (Fr.) Quél.**

Cluj district: in the grassy places, at Făget Clujului, nearby Cluj-Napoca; 29 VII 1957; Gs; HMş 943 under *Agaricus parkensis* Fr. (syn.); 6 ex.

***Rhodophyllus staurosporus* (Bres.) J.E. Lange (1936)**

Cluj district: in the peat bogs, in Apuseni Mountains, at Molhaşul de la Călăţele and on Negru Hill; 4 X 1962; Gs - EPbr; HMş 950 under *Rhodophyllus staurosporus* Lge., *Nolanea staurospora* Bres. (syn.); 2 ex.

Fam. Hygrophoraceae

***Hygrocybe calyptriformis* (Berk. & Broome) Fayod**

Cluj district: in the mountain meadows, on Mount Vlădeasa, at Pietrele Albe from Apuseni Mountains; 27 VIII 1958; Gs; ☉; HMş 660 under *Hygrocybe calyptriformis* (Bk.et Br.) Fay.; 2 ex.

***Hygrocybe chlorophana* (Fr.) P. Karst.**

Cluj district: in the meadows, on Galicer Hill, at Cluj-Napoca; 20 X 1968; Gs; ☉; HMş 663 under *Hygrophorus chlorophana* (Fr.) Karst.; 2 ex.

***Hygrocybe conica* (Schaeff.) P. Kumm.**

Sălaj district: in the meadows, at Năpradea, nearby Jibou; 3 VIII 1977; Gs; ☉; HMş 661 under *Hygrocybe conica* (Scop. ex Fr.) Kumm.; 4 ex.

***Hygrocybe irrigata* (Pers.) Bon**

Alba district: in the meadows, pastures and grasslands, at Detunata from Apuseni Mountains; 20 IX 1968; Gs; ☉; HMş 658 under *Hygrocybe unguinosa* (Fr.) Karst.; 2 ex.

***Hygrocybe nigrescens* (Quél.) Kühner (1926)**

Cluj district: in the meadows, at Făget, at Cluj-Napoca; 28 VI 1959; Gs; ☉; HMş 662 under *Hygrocybe nigrescens* (Quél.) Kühn.; 3 ex.

***Hygrocybe psittacina* (Schaeff.) P. Kumm.**

Cluj district: in the mountain meadows, on Mount Vlădeasa, at Pietrele Albe; 4 VII 1959; Gs; HMş 659 under *Hygrocybe psittacina* (Schff. ex Fr.) Karst.; 6 ex.

***Hygrocybe punicea* (Fr.) P. Kumm.**

Alba district: in the mountain meadows, at Detunata, at Arieşului Valley; 20 IX 1968; Gs; ☉☉☉; HMş 664 under *Hygrocybe punicea* (Fr.) Kumm.; 2 ex.

***Hygrocybe virginea* (Wulfen) P.D. Orton**

Cluj district: in the meadows, at Plecica Valley, at Cluj-Napoca; 15 X 1964; Gs; ☉☉; HMş 657 under *Camarophyllus niveus* (Scop.ex Fr.) Karst.; 10 ex.

***Hygrophorus agathosmus* (Fr.) Fr.**

Cluj district: on the soil of the coniferous forests from Mount Vlădeasa, at Răcadului Valley, under *Picea*, among moss; 21 X 1962; Gm; ☉; HMş 651 under *Agaricus agathosmus* Fr. (syn.); 6 ex.

***Hygrophorus arbustivus* Fr.**

Cluj district: on the wet soil, under *Quercus*, in the deciduous forests, at Cluj-Napoca, at Lomb forest; 21 XI 1960; Gm; HMş 655; 2 ex.

***Hygrophorus chrysaspis* Métrod (1938)**

Bistriţa Năsăud district: on the limestone soils, under *Fagus*, in the deciduous and

coniferous forests from Rodnei Mountains, under Corongiș Peak; 29 VIII 1964; Gm; ; HMș 647 under *Hygrophorus chrysaspis* Métz.; 8 ex.

***Hygrophorus chrysodon* (Batsch) Fr. (1838)**

Cluj district: on the soil of the deciduous forests, especially in the beech forests, nearby Făgetul Clujului; 19 VIII 1962; Gm; ; HMș 644; 10 ex.

***Hygrophorus cossus* (Sowerby) Fr. (1838)**

Cluj district: in the deciduous forests, especially under *Fagus*, at Făget-Cluj; 17 X 1960; Gm; HMș 646 under *Hygrophorus cossus* (Sow. ex Bk.) Fr.; 5 ex.

***Hygrophorus eburneus* (Bull.) Fr. (1838)**

Bistrița Năsăud district: on the soil of the deciduous and coniferous forests from Rodnei Mountains, at Vinului Valley; 1 X 1961; Gm; ; HMș 645 under *Hygrophorus eburneus* (Bull. ex Fr.) Fr.; 10 ex.

***Hygrophorus hypothejus* (Fr.) Fr.**

Bistrița Năsăud district: on the soil of the coniferous forests from Rodnei Mountains, at Vinului Valley; 1 XI 1964; Gm; ; HMș 648; 10 ex.

***Hygrophorus leucophaeus* (Scop.) Fr.**

Cluj district: on the soil, under *Fagus*, in the beech and hornbeam forests, at Cluj-Napoca, nearby Fântâna lui Bilașcu; 25 X 1958; Gm; ; HMș 656 under *Hygrophorus leucophaeus* (Scop. ex Fr.) Fr.; 5 ex.

***Hygrophorus olivaceoalbus* (Fr.) Fr.**

Cluj district: on the soil of the coniferous forests from Gilăului Mountains, at Băișoara, under Buscat Peak, among moss, under *Picea*; 30 VIII 1959; Gm; ; HMș 650; 5 ex.

***Hygrophorus penarius* Fr.**

Cluj district: on the limestone soils, in the deciduous forests, in the beech and oak forests, at Făgetul Clujului; 13 IX 1968; Gm;   ; HMș 643; 3 ex.

***Hygrophorus persoonii* Arnolds**

Cluj district: on the deciduous forests, especially in the oak forests, in Hoia Forest, at Cluj-Napoca; 22 XI 1960; Gm; HMș 649 under *Hygrophorus dichrous* Kühn. et Romagn.; 3 ex.

***Hygrophorus pudorinus* (Fr.) Fr.**

Bistrița Năsăud: on the limestone soils, under *Abies*, in the coniferous forests from Rodnei Mountains, at Vinului Valley; 17 IX 1963; Gm; ; HMș 654; 2 ex.

***Hygrophorus pustulatus* (Pers.) Fr.**

Bistrița Năsăud district: on the soil of the coniferous forests from Rodnei Mountains, at Vinului Valley, under *Picea*; 1 XI 1964; Gm; ; HMș 652 under *Hygrophorus pustulatus* (Pers. ex Fr.) Fr., *Agaricus pustulatus* Pers. ex Fr. (syn.); 8 ex.

***Hygrophorus russula* (Schaeff.) Quél.**

Cluj district: in the deciduous forests, under *Quercus*, on Galicer Hill, at Cluj-Napoca; 16 VIII 1959; Gm; ; 3 ex.; HMș 653 under *Hygrophorus russula* (Schff. ex Fr.) Quél.; 3 ex.

Conclusions

The collection has an important value, first of all, because it emphasizes a part of the patrimony of our museum, secondly, due to the fact that it completes the knowledge concerning the ecology and chorology of some macromycetes from Romania and finally, because of the antiquity of some species (for more than half a century) and the collector's notoriousness.

Abbreviations

ex. – number of specimens
HMŞ – the Herbarium of the Natural Science Museum
from Târgu-Mureş
Ex – mycetoendoxilophyta
EPbr – mycetoepibryophyta
EPx – mycetoepixilophyta
Gm – mycetogeophyta mycorrhiza
Gs – mycetogeophyta saprophytica
Th – mycetotherophyta

Conventional signs

☉ = edible species at a minimum value
☉☉☉ = edible species at a high food value
☉☉☉☉ = edible species at a very high food value
+ = toxic species (causes gastric and intestinal poisoning)
++ = very toxic species (causes intoxication of the nervous system)
+++ = very toxic species (causes deadly intoxications)
Without mark = species cannot be eaten

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MACROMICETE DIN ORDINUL AGARICALES ÎN COLECȚIA "GHEORGHE SĂLĂGEANU" A MUZEULUI DE ȘTIINȚELE NATURII DIN TÂRGU-MUREȘ (I)

(rezumat)

Lucrarea prezintă o parte din colecția de macromicete „Gheorghe Sălăgeanu”, din herbarul Muzeului de Științele Naturii din Târgu-Mureș, adică 92 de taxoni de macromicete, aparținând la 6 familii din ordinul Agaricales: Agaricaceae, Amanitaceae, Bolbitiaceae, Coprinaceae, Entolomataceae, Hygrophoraceae.

Pentru fiecare specie, s-a indicat denumirea științifică, locul colectării, data colectării, forma biologică, gradul de comestibilitate sau de toxicitate (prin semne convenționale), numărul sub care se regăsește în registrul de inventar „Plante inferioare”, al Muzeului de Științele Naturii din Târgu-Mureș, precum și numărul de exemplare.

Colecția este valoroasă, pe de o parte, datorită faptului că pune în valoare o parte din patrimoniul muzeului mureșean, pe de altă parte, datorită faptului că ea completează cunoștințele asupra ecologiei și corologiei unor specii de macromicete din România și nu în ultimul rând, datorită vechimii unora dintre piesele sale (peste 50 de ani), precum și a renumelui colecționarului.

Una dintre speciile studiate, *Hygrocybe calyptriformis*, este amenințată la nivel european.

ZOOLOGY

CONTRIBUTIONS TO THE KNOWLEDGE OF THE BEETLES FAUNA FROM BRASSICA NAPUS OLEIFERA L. CROPS IN THE REPUBLIC OF MOLDOVA

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Abstract: The purpose of this research was to identify the fauna of Coleoptera of rapeseed crop agroecosystems in Republica of Moldova. A total number of 33 species from 28 genera and 10 families were identified. The complex of Coleoptera typical for rapeseed crop including pest species were revealed.

Keywords: Coleoptera, species diversity, culture of turnip rape.

Introduction

Beetles are an essential component of each biotope. Under the anthropogenic influence, an important part of natural ecosystems have been converted into agrocoenose, which led to changes in agrocoenose complexes structure and specific diversity of ground beetles. In Republic of Moldova, agricultural ecosystems constitutes 75.6% of the total surface. These include cereal, fruit, wine, vegetables, fodder and technical crops agro-fitocoenoses [2]. Technical crops are widely used in industry and food. One of the oilseed crops of great importance, cultivated in Republic of Moldova is culture of turnip rape. This is an early honey plant, which gives better yields on chernozemic soils, and is big consumer of nutrients from the soil [1]. The main purpose of this paper is to evidence the beetle fauna of the culture of turnip rape in various localities of the Republic of Moldova, of the potential pests of this crop.

Financial support was provided by the program of bilateral cooperation between Republic of Moldova and Romania project № 10. 820. 04. 16/RoA.

Materials and methods

Faunistic material analyzed in this paper was collected from two lots of turnip rape in the center and south of the country (localities Băcioi and Troița Nouă). For extraction of beetles were used soil traps type Barber (two draws of 10 traps in each group examined at an interval of 10 days) and entomological net (one sample of 50 in both groups of investigated lots). Collections were made in spring 2011. The material was determined according to external morphological characters [3]. Were analyzed 487 samples of beetles.

Results and discussions

As a result of research conducted on beetles from the two groups of turnip rape in localities Băcioi and Troița Nouă were collected with soil traps type Barber and entomological net methods 33 species of beetles, wick belonging to 10 families. The most numerous in terms of specific species were families Scarabaeidae (8 species), Carabidae (7 species) and Curculionidae (5 species). Follow the families Tenebrionidae and Silphidae with 3 species each and families Chrysomelidae and Coccinelidae – with 2 species. Families Nitidulidae, Dermestidae and Cantharidae have found only one single species. In Table 1, are presented the collected points and the number of collected samples from the mentioned localities.

Beetles are a very diverse group of insects in that the structure and their role in the biotope occupied. This is an important link in the food chain in any type of ecosystem and also plays a role in processes humificare and recycling of matter and energy in nature. For some agricultural ecosystems phytophagous beetles can have a negative impact.

Table 1: Abundance and structure of beetle species of the culture of turnip rape

Taxon		The locality, date and number of collected samples				
		Troița Nouă 31.03– 15.04	Troița Nouă 15–27.04	Băcioi 6–17.05	Băcioi 17–27.05	Net, both localities
Curculionidae						
1	<i>Ceutorhynchus pallidactylus</i> (Marsham, 1802)	–	6	1	2	7
2	<i>Ceutorhynchus assimilis</i> (Paykull, 1792)	7	22	6	2	19
3	<i>Otiorhynchus velutinus</i> Germar, 1824	–	1	–	–	–
4	<i>Stenocarus ruficornis</i> (Stephens, 1831)	9	8	–	–	–
5	<i>Tanymecus palliatus</i> (Fabricius, 1787)	–	8	–	–	–
Tenebrionidae						
6	<i>Blaps lethifera</i> Marsham, 1802	–	–	3	–	–
7	<i>Gonocephalum pusillum</i> (Fabricius, 1792)	–	–	2	2	–
8	<i>Opatrum sabulosum</i> (Linnaeus, 1761)	4	16	18	5	–
Carabidae						
9	<i>Amara aenea</i> (De Geer, 1774)	1	3	–	–	–
10	<i>Anchomenus dorsale</i> (Pontoppidan, 1763)	–	–	3	–	–
11	<i>Brachinus crepitans</i> (Linnaeus, 1758)	–	–	3	–	–
12	<i>Carabus coriaceus</i> Linnaeus, 1758	–	–	1	–	–
13	<i>Harpalus distinguendus</i> (Duftschmid, 1812)	1	9	15	27	–
14	<i>Harpalus rufipes</i> De Geer, 1774	–	–	3	1	–
15	<i>Ophonus schaubergerianus</i> Puel, 1937	–	–	1	2	–
Chrysomelidae						
16	<i>Phyllotreta</i> sp.	2	17	–	–	–
17	<i>Psylliodes chrysocephala</i> (Linnaeus, 1758)	45	21	1	–	–
Nitidulidae						
18	<i>Meligetis aeneus</i> (Fabricius, 1775)	–	20	1	–	62
Scarabaeidae						
19	<i>Aphodius distinctus</i> (Müller 1776)	1	2	–	–	–
20	<i>Aphodius melanostictus</i> Schmidt, 1840	–	1	–	–	–
21	<i>Epicometis hirta</i> (Poda, 1761)	–	–	3	2	59
22	<i>Lethrus apterus</i> (Laxman, 1770)	–	2	–	–	–
23	<i>Onthophagus kindermanni</i> Harold, 1877	–	1	–	–	–
24	<i>Onthophagus ovatus</i> Linnaeus, 1767	–	1	–	–	–

25	<i>Onthophagus vitulus</i> (Fabricius, 1776)	–	–	–	1	–
26	<i>Pleurophorus caesus</i> (Panzer, 1796)	–	3	–	–	–
Coccinellidae						
27	<i>Coccinella septempunctata</i> (Linnaeus, 1758)	–	1	–	–	6
28	<i>Thea vigintiduopunctata</i> (Linnaeus, 1758)	–	–	1	1	–
Dermestidae						
30	<i>Dermestes lanarius</i> Illiger, 1801	–	2	7	16	–
Cantharidae						
31	<i>Cantharis rustica</i> Fallen, 1807	–	–	11	2	18
Silphidae						
32	<i>Nicrophorus vestigator</i> Herschel, 1807	–	–	–	1	–
33	<i>Silpha obscura</i> Linnaeus, 1758	–	–	3	–	–
34	<i>Tanathophilus rugosus</i> (Linnaeus, 1758)	–	–	–	1	–

Material accumulated on the two investigated lots presents the composition of species of beetles and their dominance in the culture of turnip rape during the months of March-May, 2011. Most reported species are phytophagous (15 species), but were recorded also coprophagous (6) and necrophagous beetles (3), which were attracted by lower vertebrates, good into Barber traps and found in decomposition. Between coprophagous beetles stands genres *Onthophagus* with 3 species, *Aphodius* with 2 species and *Lethrus* with a species. Species of Silphidae family are necrophagous. With Barber traps were collected edaphic phytophagous beetles, that otherwise would not have been reported. Among those are mentioned the species: *Opatrum sabulosum*, *Lethrus apterus*, *Harpalus distinguendus* and *Pseudophonus rufipes*. These phytophagous species attack plants at soil level. In the culture of turnip rape were reported the following pests: *Meligetis aeneus* (**83 specimens**), *Psylliodes chrysocephala* (**67 specimens**), *Epicometis hirta* (**64 specimens**) and *Ceutorhynchus assimilis* (**56 specimens**). Also, in the culture of turnip rape were found six species zoophagous, which helps to maintain staff numbers of phytophagous insects, 2 species saprophagous that contribute to decomposition of plant debris and one micophagous species.

Conclusions

In the culture of turnip rape were identified in total 533 copies of beetles, belonging to 33 species, 28 genres and 10 families. Out of these, 362 samples were collected with Barber method and 171 – with net. The most abundant beetles reported from turnip rape culture were species of pests *Meligetis aeneus* și *Psylliodes chrysocephala*.

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**CONTRIBUȚII LA CUNOAȘTEREA FAUNEI DE COLEOPTERE
DIN CULTURA DE RAPIȚĂ DIN REPUBLICA MOLDOVA**

(rezumat)

Lucrarea prezintă un studiu efectuat asupra coleopterelor din cultura de rapiță. Materialele au fost colectate atât prin metoda Barber, cât și cu fileul entomologic. Au fost efectuate cercetări pe două câmpuri de rapiță din zona de centru și de sud a Republicii Moldova. Fauna coleopterelor semnalate în această cultură numără 33 de specii care aparțin la 10 familii. Cu ajutorul capcanelor Barber au fost colectate coleopterele edafice fitofage, care altfel nu ar fi putut fi semnalate. Printre acestea menționăm speciile *Opatrum sabulosum*, *Lethrus apterus*, *Harpalus distinguendus* și *Pseudophonus rufipes*. În cultura de rapiță au fost semnalate și unele specii dăunătoare care, fiind neglijate, pot compromite această cultură. Acești dăunători sunt: *Meligetis aeneus*, *Psylliodes chrysocephala*, *Epicometis hirta* și *Ceutorhynchus assimilis*.

LATEST DATA CONCERNING THE SPREAD OF *PHYTOPHAGOUS CERAMBYCIDAE COLEOPTERA* IN THE TÂRNAVA GEOGRAPHICAL BASIN

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Abstract: This work wants to bring a substantial contribution to the effort of studying the coleopteras from the family Cerambycidae/longhorn beetles, phytophagous cerambycidae from the Târnava geographical basin. The author made in this purpose many journeys of collecting longhorn beetles over a period of time more than a decade beginning in 1998. The biggest part of cerambycidae family are xilofagous, but there are also a significant number of phytophagous species which grows inside grassy plant stems. The phytophagous cerambycidae acquisition were carried out in the main areas with grassy vegetation from the western part of the Târnave plateau mainly Târnavenilor peak, Cornești-Cetatea de Baltă zone, steppe zones from Biia – Ocnișoara and Nature 2000 Site Sighișoara-Târnava Mare. There were collected samples belonging to 22 species, which represents three subfamilies. From the species collected, two are rare: *Pilemia tigrina* and *Musaria argus*. The phytophagous longhorn beetles appear by installment throughout the grassy plants vegetation period.

Keywords: cerambycidae, phytophagous, stems, steppe.

Introduction

The longhorn beetles (Coleoptera: Cerambycidae) can be recognized by its extended body and its long antennas which generally reach or exceed the edge of the elytra. The eyes are usually strongly notched. The tarsi appear to be composed of four segments with the third segment bilobed, but they are actually five-segmented. The fourth segment is small and concealed in the notch of the third segment; it is often very difficult to see [4].

There are approximately 25000 known species, the majority of which spread in Neotropical and Oriental fauna. Among them the biggest species of Coleoptera, some Prioninae from Amazonian rain forests can reach up to 17 cm in length including the mandibles – *Macrodonia cervicornis*, or *Titanus giganteus*, the biggest known coleoptera. *Xixuthrus heros* and the related species are the biggest cerambycidae known in Indonezia.

Romania's fauna includes 250 species, the biggest part of cerambycidae being xilofagous, but also a significant number of phytophagous species which develop inside the stems of the grassy plants. Several new species were described [2].

The fauna of phytophagous cerambycidae offer a thorough image about the spread of the natural grassy formations as well as about the degree in which these formations were affected by human activities such as grazing, mowing, agriculture fields. In the last decades, a new series of new data were brought, especially by finding out about host plants and the development

cycle. For many species from the Central Europe, a detailed research has led to the analyses of numerous new populations, including our country.

An important contribution in studying the Coleoptera on the Romanian territory have been done: Bielz (1850, 1852, 1853, 1887), Siedlitz (1891), Petri (1912), Csiki (1895), Worel (1951) – concerning the Cerambycidae group in Transylvania. Researchers like Hormuzachi (1902, 1904), Montandon (1906), Ieniştea (1932), Panin (1941), Săvulescu (1969, 1972), Serafim (1985, 1997, 1998, etc...), Ruicănescu (1992, 1997) have collected a rich material in Romania, establishing extensive fauna lists, which include the Cerambycidae species, too.

Recently, works concerning longhorn beetles have been published by Togănel (2004), Istrate (2005), Serafim (2010), Dascălu (2007).

The biological material concerning the Cerambycidae group species is found in the collections of the Natural History Museum in Sibiu, the Agronomy Faculty in Timişoara, the Forestry Institute in Braşov, the “Grigore Antipa” National Natural History Museum in Bucharest [9,10], the Museum of Natural Science in Târgu-Mureş [11], as well as in other small museums: Mediaş, Aiud, Odorheiu Secuiesc, and few private collections.

The Cerambycidae fauna in Romania is relatively well known due to these collections and to the fauna lists that have been published [6,7]. Although relatively old, “Coleoptera – Cerambycidae” in the Fauna of the People’s Republic of Romania, 10–5 by Panin&Săvulescu (1961) [5] is still the most complex study published in Romania so far.

Materials and Methods

The activity of collecting Coleoptera insects from Cerambycidae family has been performed sporadically extended over a period of time more than a decade beginning in 1998, and the purpose of this work is to bring forward a collection of new data connected to the spread of the phytophagous coleoptera from this family in the low land areas from the western and central part of the Târnava basin.

The phytophagous Cerambycidae were collected manually from different part of host herbs, after the identification and inspection, such as *Matricaria* sp., *Artemisia* sp., *Anchusa barrelieri*, *Cirsium* sp., *Echium* sp. etc. An entomological net was used when mowing the grass in the steppe areas, or the blooming herbs in the meadows or on the edge of the forests. The steppe Cerambycidae species, such as the ones in the Dorcadion and Neodorcadion genera, were collected from the glades and meadows, from the edge of the forests, or from the local country roads – in spring and also in early summer. Many some of the Cerambycidae species were collected.

The best results were obtained in the case of the diurnal Cerambycidae species after 10 o’clock in the morning as the sun raises higher. All the species are thermophilic and mesophilic and get warmed up in the sun in the daytime. Notes were regularly took regarding the local floral merocenoses, which are that groups of animals which visit the same flower, more Coleoptera species were collected and the samples were preserved in ethyl ether or alcohol. The Coleoptera species profusely covered with hairs and the ones that presented a certain elytra (tegument) pattern were carefully collected and kept alive. The material collected was pinned and kept in cases belonging to the author’s collection or to the Natural Science Museum in Târgu Mureş, which took over a part of this material (2001).

The determination of the Cerambycidae was done using the determination keys established by Bense U. (1995) [1] and the Atlas of the Cerambycidae of Europe and the Mediterranean Area, Vol. 1, Sama G. (2002) [8].

Results and Discussions

The phytophagous cerambycidae acquisition were carried out in the main areas with grassy vegetation from the western part of the Târnava plateau mainly Târnăvenilor peak, Cornești-Cetatea de Baltă zone, steppe zones from Biia – Ocnișoara and Nature 2000 Site Sighișoara-Târnava Mare.

The characterization of the acquisition zones and the researched habitats

The Târnăvenilor Peak: It begins from the western part of the town of Târnăveni, Adămuș village and is extended to the contact zone with Transylvanian Subcarpathians in east. It has the aspect of a suspended bridge with southern slopes steeper and sunny, which allows the development of an interesting grassy formations. Unfortunately, it's pretty full of grazing areas and there are also vineyards or *Pinus sylvestris* forests.

Cornești-Cetatea de Baltă. It comprises a vegetal mosaic composed of oak forests and meadows quite well preserved. The best can be found on "The Face of the City Area", Cornești village where there are grass lands covered with *Stipa* sp. Others are placed in the north of Cetatea de Baltă, including steppe slopes from Crăiești, where there also vegetate numerous steppe plants.

Biia-Ocnișoara Zone. This is the most droughty zone, almost completely without forests, similar with those from Transylvania Plain and Secaș Plateau, characterized by the presence of numerous "glimee" type landslides among which there are natural lakes, called by natives "tăuri". The southern slopes are steep with steppe vegetation, but in higher areas from the north of the areal are subjected to grazing frequently, which has deteriorated the vegetal carpet.

Sighișoara-Criș Zone (placed in Nature Site 2000 Sighișoara-Târnava Mare). This is an area characterized by high ground, with extended forests composed of beech on the shadowy slopes and oak – holm on the sunny slopes. The meadows are mesophilic and xerophilic as well on the southern slopes, with steep slope, very frequently in the place called Spinarea Câinelui.

The list of phytophagous longhorn beetles (Coleoptera: Cerambycidae) collected by author from Târnava geographical basin:

Subfamily Lepturinae

Genus *Vadonia* Mulsant, 1863

Vadonia unipunctata (Fabricius, 1787)

Crăiești, 4.06.2011, Cerghid, 6.06.2003, Criș, 16.06.2009, Roadeș, 15.06.2009, Meșendorf, 15.06.2009.

Habitat: in glades, mesophilic meadows, on *Scabiosa columbaria*, *Knautia arvensis*, *Leucanthemum vulgare* and *Centaurea* sp.

Genus *Pseudovadonia* Lobanov, Danilevsky et Murzin, 1891

Pseudovadonia livida (Fabricius, 1776)

Târnăveni, 6.07.1998, 27.05. 2001, Roadeș, 5.VII.2009, Bazna, 26.05.2002,

Habitat: steppic and mesophilic meadows, on flowers of *Achillea millefolium* and *Erigeron annuus*.

Subfamily **Cerambycinae**

Genus *Plagionotus* Mulsant, 1842

Plagionotus floralis (Pallas, 1773)

Târnăveni, 06.2007, 14.06.2008 – Groapa Șoroșpata, Cetatea de Baltă, 25.06.2006, Ocnișoara, 06.2010, Crăiești, 4.06.2011, Bunești, 15.06.2009, Apold, 4.VII. 2009.
Habitat: in dry meadows, on *Achillea millefolium* and *Leucanthemum* sp.

Subfamily **Lamiinae**

Genus *Neodorcadion* Latreille, 1825

Neodorcadion bilineatum (Germar, 1824)

Cerghid/Mica, 05.2002, 29.04.2011, Boian, 05.2006 (very frequent in the place called Spinarea Căinelui), Cornești, 7.IV.2007.

Habitat: in dry meadows, on the ground, the larva develops itself in the stems of the grassy plants.

Genus *Pedestredorcadion* Breuning, 1943

Pedestredorcadion pedestre (Poda, 1761)

Cetatea de Baltă, 06, 2006, Târnăveni 04, 2005, Cerghid, 29.04.2011, Crăiești, 4.06.2011, Bobohalma, 25.04.2000, Boian, 26.04.2008.

Habitat: in dry meadows, on the ground, the larva develops itself in the stems of the grassy plants.

Pedestredorcadion murrayi (Kuster, 1847)

Cerghid, 05.06.2005 (in meadow)

Habitat: in dry meadows, on the ground, the larva develops itself in the stems of the grassy plants.

Pedestredorcadion scopoli (Herbst, 1784)

Cerghid, 29.04.2011, 24.04.2010, Crăiești. 2.05.2010, Târnăveni.

Habitat: in dry meadows, on the ground, the larva develops itself in the stems of the grassy plants.

Genus *Carinatodorcadion* Breuning, 1943

Carinatodorcadion fulvum (Scopoli, 1763)

Cornești, 29.04.2001, Cerghid, 29.04.2011, Crăiești, 27.04.2010, 4.06.2011, Bobohalma, 25.04.2000.

Habitat: in dry meadows, on the ground, the larva develops itself in the stems of the grassy plants.

Genus *Agapanthia* Serville, 1835

Agapanthia violacea (Fabricius, 1775)

Târnăveni, 28.04.2007, Crăiești, 05.2011, Dâmbău, 20–25.05.2011.

Habitat: in mesophilic meadows, on stems of *Onobrychis viciifolia*, *Medicago sativa*.

Agapanthia dahli (Richter, 1821).

Crăiești, 16.06.2009, 28.05.2011.

Habitat: in steppic meadows, on stems of *Carduus acanthoides*.

Agapanthia villosiviridescens (De Geer, 1775)

Târnăveni, 23.05.2000, 12.06.2011, Cornești 20.05.2001, Cerghid, 05.2007, 7.06.2008, Meșendorf, 14.06.2009.

Habitat: in meadows, edges of glades with mesophilic, on *Aconitum* sp., *Urtica dioica*, *Heracleum* sp.

Genus *Pilemia* Fairmaire, 1864

Pilemia tigrina (Mulsant, 1851)

Crăiești, 20–22.05.2009, 15.05.2010, 15.05.2011.

Habitat: on stems and flowers of *Anchusa barrelieri*.

Genus *Cardoria* Mulsant, 1862

Cardoria scutellata (Fabricius, 1792)

Târnăveni, 9.04.1999 (on Târnăvenilor peak).

Habitat: in dry meadows, on stems of *Falcaria vulgaris* and *Euphorbia cyparissias*.

Genus *Musaria* Thomson, 1864

Musaria argus (Frölich, 1793)

Crăiești, 28.06.2010.

Habitat: in dry meadows, on stems of *Seseli annuum*.

Musaria affinis (Harrer, 1784)

Târnăveni, 10.06.2010, 12.06.2011, Cetatea de Baltă, 11.06.2002.

Habitat: On the leaves of *Chaerophyllum aromaticum*, in the sun.

Genus *Opsilia* Mulsant, 1862

Opsilia coerulescens (Scopoli, 1763)

Biia, 20.05.2011, Bazna, 20.05.2006, Roadeș, 15.06.2009, 2–4.07.2009.

Habitat: in dry meadows, on stems and flowers of *Echium maculatum* and *Echium vulgare*.

Genus *Phytoecia* Dejean, 1835

Phytoecia cylindrica (Linnaeus, 1758)

Târnăveni, 05.2000, 20.06.2005

Habitat: edges of forests, on stems of *Daucus carota* and *Chaerophyllum aromaticum*.

Phytoecia icterica (Schaller, 1783)

Mediaș (forest Bazna), 20.05.2006, Târnăveni, 15.06.2000, 14.06.2008, 12.VI.2000, 1–5.06.2004, 1.04.2006, Criș, 8.06.2000, Herepea, 27.06.2009.

Habitat: on the stems and flowers of *Daucus carota* and *Pastinaca sativa*.

Phytoecia caerulea (Scopoli, 1772)

Târnăveni, 06.2011 (near railway).

Habitat: in dry meadows, on blossomed stems of *Brassica elongata* and *Sisymbrium strictissimum*.

Phytoecia pustulata (Schrank, 1776)

Târnăveni, 05.2003 – Trei Brazi, graveyard, 10.06.2000, 2.05. 2003, Cerghid, 15.06.2009.

Habitat: in dry meadows, on inflorescences of *Achillea millefolium*, *Chrysanthemum* sp.

Phytoecia virgula (Carpentier, 1825)

Biia, 29.05.2011, Cornești, 06.2004 (hill “The Face of the City Area”).

Habitat: in dry meadows, on inflorescences of *Chrysanthemum* sp. More rare than the previous species.

Genus *Oberea* Dejean, 1835

Oberea erythrocephala (Schrank, 1776)

Crăiești, 4.06.2011, Biia, 29.05.2011, Herepea, 27.05.2009.

Habitat: in dry meadows, on Euphorbiaceae, especially on *Euphorbia cyparissias*.

There were collected samples belonging to 22 species, which represents three subfamilies. From the species collected, two are rare: *Pilemia tigrina*, a protected species mentioned in the second Anexa Habitats Directive of European Environment Agency, and *Musaria argus*, a steppe species rarely observed in Romania. The rest of the species are common, encountered in the majority of the natural meadows, dependent on xerophilous habitats, in which the host plants vegetate.

Commentary about the apparition periods of the adults

The phytophagous longhorn beetles appear by installment throughout the grassy plants vegetation period. The first species, belong to the genera of the Dorcanini tribe, which appear at the end of March, sometimes, as it happened in 2011. All the species belonging to Dorcanini tribe appear all at once, less *Dorcadion murrayi*, which probably appears in May. In the same time with longhorn beetles from Dorcanini appears *Cardoria scutellata* and then by installment towards the end of April more species of *Phytoecia* [3], such as *Phytoecia virgula* and *Phytoecia pustulata*. Towards the end of April and the beginning of May, the majority of species appear, beginning with *Pilemia tigrina* and different species of *Agapanthia* sp. Basically the middle and the end of May represent the period with the most phytophagous longhorn beetles, the moment when the grassy plants from the steppe meadows reached maturity and form flowers. In June the decline is visible, with the gradual drying of the vegetation. A series of species appear such as *Musaria* sp. and Lepturinae or Cerambycinae, *Pseudovadonia livida*, *Vadonia unipunctata* and *Plagionotus floralis*. During July, as the temperature rises powerfully and the grassy vegetation dries, from steppe meadows all the known species, whose adults could be found on the inflorescences of some summer plants disappear.

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NOI DATE REPREZENTÂND RĂSPÂNDIREA COLEOPTERELOR CERAMBYCIDAE FITOFAGE ÎN BAZINUL GEOGRAFIC AL TÂRNAVEI

(rezumat)

Această lucrare dorește a aduce o contribuție substanțială la efortul de cunoaștere a coleopterelor cerambycide fitofage, familia Cerambycidae, din bazinul geografic al Târnavelor. Autorul a realizat în acest scop numeroase deplasări de colectare a cerambycidelor, pe o perioadă care s-a întins pe mai mult de zece ani, începând cu 1998. Cea mai mare parte a coleopterelor din familia Cerambycidae sunt xilofage, dar, de asemenea, există și un număr semnificativ de specii fitofage care se dezvoltă în tulpinile plantelor ierboase. Colectarea cerambycidelor fitofage s-a realizat în special din ariile cu vegetație ierboasă din partea de vest a podișului Târnavelor, și anume: Culmea Târnavenilor, zona Cornești-Cetatea de Baltă, zonele stepice Biia – Ocnișoara și situl Natura 2000 Sighișoara-Târnava Mare. Au fost colectați indivizi aparținând la 22 de specii, care reprezintă trei subfamilii. Dintre speciile colectate, două sunt rare: *Pilemia tigrina* și *Musaria argus*. Cerambycidele fitofage apar treptat, odată cu creșterea vegetației ierboase anuale.



Fig. 1: Biia – Ocnișoara. This is the most droughty zone, where the southern slopes are steep with steppe vegetation



Fig. 2: *Pilemia tigrina* on flowers of *Anchusa barrelieri*



Fig. 3: *Musaria argus* on stem of *Seseli annuum*

DATA ABOUT NOCTUID LEPIDOPTERA SPECIES (*LEPIDOPTERA*, *NOCTUIDAE*) IDENTIFIED IN AN URBAN ECOSYSTEM – THE BOTANICAL GARDEN GALAȚI, ROMÂNIA

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Abstract: Data about noctuid lepidoptera species has been brought from the South-East part of Romania. The research was spread on a period of 5 years and revealed the diversity of this moth family in an urban ecosystem – The Botanical Garden Galați. The results show that even an urban habitat, surrounded by buildings in a highly industrialized city like Galați can conserve a relative high diversity of nocturnal Lepidoptera species.

There were identified 141 species of Noctuidae Family, that represents 22.8% of the total noctuid species mentioned in Romania.

Keywords: Noctuidae, light traps, Botanical Garden, Galați.

Introduction

Galați county is situated in the South-East of Romania (45°25' N 27°20' E). The Botanical Garden is placed near the confluence of the River Siret with the Danube. The climate is steppe typical with a low level of precipitation.

The present study had been developed in an urban ecosystem, The Botanical Garden of The Natural Sciences Museum Complex Galați. The Botanical Garden is an urban habitat, situated in the city and surrounded by buildings. The Botanical Garden organization was described in previous papers (Cristescu, 2010). This paper provides data only about the Noctuidae Family.

Material and methods

The researches have been made during a period of 5 years (2004, 2005, 2008, 2009 and 2010). In order to collect the nocturnal Lepidoptera we used 3 light traps that were functional 3 days a week; from March untill October, from dusk till dawn.

Results and discussions

During the period of study there were identified 141 species from the Noctuidae Family (table 1). Only 31 species were collected every year on the Botanical Garden territory: *Acronicta rumicis*, *Dysgonia algira*, *Aedia leucomelas*, *Tyta luctuosa*, *Emmelia trabealis*, *Protoschinia scutosa*, *Helicoverpa armigera*, *Platyperigea kadenii*, *Paradrina clavipalpis*, *Hoplodrina ambigua*, *Charanyca trigrammica*, *Trachea atriplicis*, *Mesoligia furuncula*, *Mesapamea secalis*, *Hadula trifolii*, *Lacanobia*

w-latinum, *Lacanobia oleracea*, *Mythimna vitellina*, *Mythimna congrua*, *Mythimna l-album*, *Orthosia incerta*, *Egira conspicillaris*, *Axylia putris*, *Noctua janthina*, *Xestia c-nigrum*, *Agrotis crassa*, *Agrotis exclamationis*, *Agrotis segetum*, *Earias vernana*.

The other species were identified only occasionally at the light traps. They were attracted by our source of light from the neighboring biotopes.

Some of the noctuid species are mentioned for the first time from Moldova (Romania) and others are mentioned only from a few places in Romania.

Species mentioned for the first time from Moldova (Romania):

Macrochilo cribrumalis (Hübner 1793): ♂ 11.06.2008

Biology: Is a local species, which inhabits humid areas, near swamps. Univoltine; flight period: June to August. The larva feeds on *Carex sp.*

Distribution: Eurasiatic. North Europe, Central Europe, Bulgaria, Romania. In Romania was mentioned previously from Timișoara, Satchinez, Vinga, Brașov, Vlădeni, Săcărâmb, Sibiu, Hagieni and from Delta Dunării (Rákossy 1996).

Enargia abluta (Hübner 1880): ♀ 25.06.2008, ♂ 01.07.2008, ♂ 26.06.2008, ♂ 15.06.2009.

Biology: Is a mesohigrophyl species. Univoltine; the flight period: June to July. The larvae are polyphagous, feeding on *Populus sp.*, *Betula sp.* and *Salix sp.* (Rákossy 1996)

Distribution: Eurasiatic. From Central Europe to Ukraine, South Russia and North Iran (Székely 2006). In Romania it was previously mentioned from București, Slobozia and recently only from Delta Dunării (Székely 2006).

Archanara neurica (Hübner 1790): ♂ 24.06.2008

Biology: Is a higrophyl species. The flight period: June to August, univoltine. The larvae are feeding on *Phragmites communis* and *Phalaris arundinacea*

Distribution: Eurasiatic. Central Europe and South Europe. In Romania was mentioned from Delta Dunării, South Dobrogea, Sibiu, Ineu (Rákossy 1996).

Mythimna unipuncta (Haworth 1809): ♀ 06.10.2009, ♂ 23.10.2009, ♂ 13.07.2010, 2 ♂ 14.07.2010, ♂ 15.09.2010, ♂ ♀ 19.07.2010, ♀ 19.07.2010, ♂ 20.07.2010, ♂ 21.07.2010, ♀ 27.07.2010, 2 ♂ 03.08.2010, ♀ 20.08.2010, ♂ 20.08.2010, ♂ 23.08.2010, ♂ 30.08.2010, ♂ 30.08.2010, ♀ 31.08.2010, ♀ 06.09.2010, ♂ 14.09.2010, ♂ 15.09.2010, ♂ 17.09.2010, ♂ ♀ 22.09.2010, ♂ 23.09.2010, 2 ♀ 27.09.2010, ♂ 29.09.2010, ♀ 30.09.2010

Biology: is a xerothermophyl species. Univoltine, the flight period: August to November. The larvae are feeding on sugar cane.

Distribution: is spread in the mediterranean region. In Romania was mentioned previously from Delta Dunării, Dobrogea (Agigea, Eforie Sud, Comorova, Hagieni, Vama Veche, Canarua Fetii) (Rákossy 1996).

Mythimna congrua (Hübner 1817): ♀ 13.06.2005, ♂ 25.08.2005, ♀ 04.08.2005, ♂ 18.06.2008, ♀ 12.06.2008, ♂ 18.06.2008, 2 ♂ 24.06.2008, 2 ♂ 11.06.2008, ♀ 27.05.2009, ♂ 03.06.2009, ♀ 09.06.2009, ♂ ♀ 09.06.2009, ♂ 15.06.2009, ♀ 16.06.2009, 2 ♂ 16.06.2009, ♂ 22.06.2009, ♀ 01.07.2009, ♂ 28.07.2009, ♀ 03.08.2009, ♂ 11.08.2009, ♂ 01.09.2009, ♀ 27.05.2010, 2 ♀ 04.06.2010, ♂ 08.06.2010, 2 ♂ 09.06.2010, ♂ 14.06.2010, ♂ 03.08.2010, ♀ 22.08.2010, ♂ 23.08.2010, ♂ 24.08.2010, ♂ 30.08.2010, ♂ 30.08.2010

Biology: is a termohigrophyl species. Univoltine, the flight period: from mid July to October. The larvae are polyphagous.

Distribution: westasiatic-mediterranean. It is spread from North Africa to South Europe and Irak and Armenia. In Romania was previously mentioned from: Delta Dunării, Măcin Mountains (Rákósy 1996). Older mentions of the species are from Transilvania and Oltenia (Rákósy et al. 2003).

Agrotis syricola (Berio 1936): ♂16.09.2009, ♀21.09.2009, ♂23.09.2009, ♂22.08.2010, ♀14.09.2010, ♀14.09.2010, ♀23.09.2010.

Biology: is a mesotermophyl species, that prefers steppe and sandy habitats (Székely 2006). Bivoltine, the flight period: March to April and September to November (Skinner 2009).

Distribution: in the mediterranean basin, especially in Italy, Greece, Bulgaria, Turkey, Israel.

Species with few mentions in the Romanian lepidopterofauna:

Drasteria caucasica (Kolenati 1846): 11♀: 05.06.2008, 12.06.2008, 18.05.2009, 26.05.2009, 02.06.2009, 22.06.2009, 06.07.2009, 28.07.2009, 28.07.2009, 03.08.2009, 03.08.2009; ♂03.08.2009, ♂04.08.2009, ♀17.08.2009, ♀17.08.2009, ♀18.08.2009, ♂19.08.2009, ♀26.04.2010, ♂03.05.2010, ♀25.05.2010, ♀26.05.2010, ♀13.07.2010 .

Biology: is a termophyl species; inhabits semidesert and sandy areas. Is bivoltine, the flight period: May to September. The larvae feed on *Eleagnus* sp., *Hippophae* sp. and *Paliurus* sp. (Rákósy 1996).

Distribution: westasiatic-mediterranean: South and East Europe, Minor Asia, Armenia, South Russia, Iran, South Siberia and North China. In Romania was mentioned from Delta Dunării (Székely 2006), South Moldova and Dobrogea.

Catephia alchymista (Denis & Schiffermüller 1775): ♀03.08.2010.

Biology: in oak forests. Univoltine, the flight period: May to September. The larvae feed on *Quercus* sp. (Rákósy 1996).

Distribution: westasiatic-mediterranean: in South and Central Europe, North Africa and West Asia (Rákósy 1996). In Romania is mentioned from the South part. It was collected also from Galați county by V. Olaru in 1965, 1968, 1970 (Marcu & Rákósy 2002).

Eutelia adalatrix (Hübner 1813): ♂18.05.2008, ♂10.06.2009, ♂16.06.2009.

Biology: xerotermophyl species. Prefers steppe habitats. Bivoltine, the flight period: May to July and August to September. The larvae feed on *Ligustrum* sp., *Cotinus coggygria*, *Pistacia* sp. (Rákósy 1996).

Distribution: South Germany, South France, Spain, Hungary, Slovakia, Greece, Bulgaria. In Romania was mentioned from Cheile Nerei, Valea Cernei, Băile Herculane, Orșova, Drobeta Turnu Severin, Corabia, București and also in Dobrogea (Rákósy 1996).

In Galați county was collected by V. Olaru în Pădurea Gârboavele in 1969, 1970, 1973 (Marcu & Rákósy 2002).

Mycteroplus puniceago (Boisduval 1840): ♀ ♂ 24.08.2005, 2 ♀ 25.08.2005.

Biology: xerotermophyl species, inhabits steppe habitats. Univoltine, the flight period: July to October. The larvae feed on *Atriplex* sp. și *Chenopodium* sp.

Distribution: Bulgaria, Armenia, Caucaz, Iran. In Romania was mentioned from Dobrogea

(Eforie Sud, Techirghiol, Agigea, Constanța, Comorova, Hagieni, Canaraua Fetii, Vama Veche) and from Delta Dunării, Arad (Ineu), Gârboavele Forest (Olaru & Nemeș 1968).

Ulochlaena hirta (Hübner 1813): 2♂ 23.10.2009, ♂ 28.10.2009.

Biology: xerothermophil species, inhabits steppe habitats. Univoltine, flight period: October to November. The larvae are polyphagous.

Distribution: South Europe, Balcans, Minor Asia, Armenia, Iran, Caucaz, Turkmenistan, South Russia (Rákossy 1996). In Romania was mentioned only from the South East part of the country (Dobrogea, Delta Dunării). In Galati was collected at Garboavele Forest by Alexinschi et al. 1967 and in 1968 by V. Olaru (Marcu & Rákossy 2002).

Euxoa hastifera pomazensis (Kovács 1952): ♀ 11.09.2008, ♀ 04.09.2008, ♀ 24.09.2008, ♀ 24.09.2008, 2 ♀ 24.09.2008, ♀ 09.10.2008, ♀ 09.10.2008, ♀ 08.10.2008, ♀ 14.09.2008, ♂ 15.09.2008, ♀ 16.09.2008, ♂ 22.10.2009, ♂, 2 ♀ 17.09.2010, ♂ 28.09.2010.

Biology: xerothermophil species. Univoltine, the flight period: August to September.

Distribution: westasiatic-mediterranean: North Africa, Portugal, Spain, South France, Hungary, Slovakia, Bulgaria, Albania, Greece and South Ukraine. In Romania was previously mentioned from Transilvania (Rákossy et al. 2003), near Cluj (Rákossy & Coroiu, 1989) and Tecuci (Nemeș & Voicu 1973).

Some of the identified species are included in the Red List categories. Therefore, 49 species are listed on the Red List of Romanian Lepidoptera: 3% are endangered (EN), 10% are vulnerable (VU) and 22% are near threatened (NT) (Fig. 1).

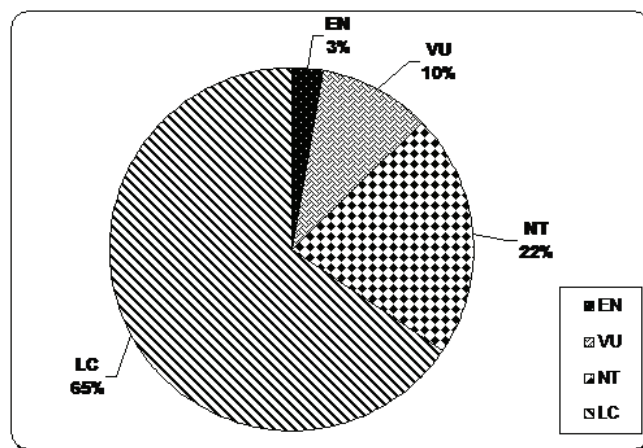


Fig. 1: The distribution of the noctuid lepidoptera species by the Red List categories.

Table 1: The systematic list of the noctuid Lepidoptera species identified in The Botanical Garden Galați and the Red List categories.

Nr. crt.	Species	2004	2005	2008	2009	2010	No. Indiv	Red List
	Noctuidae Family							
1	<i>Oxicesta geographica</i> (FABRICIUS, 1787)	–	–	–	–	7	7	NT
2	<i>Acronicta megacephala</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	1	2	–	3	LC
3	<i>Acronicta rumicis</i> (LINNAEUS, 1758)	–	6	14	2	30	52	LC
4	<i>Cryphia receptricula</i> (HUBNER, 1803)	–	–	–	1	–	1	VU
5	<i>Paracolax tristalis</i> (FABRICIUS, 1794)	–	–	–	1	2	3	LC
6	<i>Macrochilo cribrumalis</i> (HUBNER, 1793)	–	–	1	–	–	1	NT
7	<i>Zanclognatha lunalis</i> (SCOPOLI, 1763)	–	–	1	–	–	1	LC
8	<i>Zanclognatha tarsipennalis</i> (TREITSCHKE, 1835)	–	–	–	–	1	1	LC
9	<i>Catocala nupta nupta</i> (LINNAEUS, 1767)	–	–	1	1	2	4	NT
10	<i>Catocala elocata elocata</i> (ESPER, 1788)	1	1	–	3	1	6	NT
11	<i>Catocala hymanaea</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	–	1	1	NT
12	<i>Dysgonia algira algira</i> (LINNAEUS, 1767)	–	1	7	13	6	27	NT
13	<i>Prodotis stolidus</i> (FABRICIUS, 1775)	–	–	2	2	5	9	LC
14	<i>Drasteria caucasica</i> (KOLENATI, 1846)	–	–	2	15	5	22	VU
15	<i>Lygephila cracca</i> (DENIS&SCHIFFERMULLER, 1775)	–	1	–	2	2	5	LC
16	<i>Aedia funesta funesta</i> (ESPER, 1786)	–	–	–	–	5	5	NT
17	<i>Aedia leucomelas</i> (LINNAEUS, 1758)	–	1	6	7	19	33	VU
18	<i>Catephia alchymista alchymista</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	–	1	1	NT
19	<i>Tyta luctuosa</i> (DENIS&SCHIFFERMULLER, 1775)	6	39	94	205	172	516	LC
20	<i>Scoliopteryx libatrix</i> (LINNAEUS, 1758)	–	1	1	–	2	4	LC
21	<i>Calyptra thalictri</i> (BORKHAUSEN, 1790)	–	–	–	–	1	1	VU
22	<i>Hypena rostralis</i> (LINNAEUS, 1758)	–	–	–	–	2	2	LC
23	<i>Colobochyla salicalis</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	1	–	–	1	LC
24	<i>Eutelia adulatrix</i> (HUBNER, 1813)	–	–	–	3	–	3	NT
25	<i>Diachrysia chrysis chrysis</i> (LINNAEUS, 1758)	–	1	–	–	4	5	LC
26	<i>Diachrysia tutti</i> (KOSTROWICKI, 1961)	–	2	–	–	1	2	LC
27	<i>Macdunnoughia confusa confusa</i> (STEPHENS, 1850)	2	14	62	31	88	197	LC
28	<i>Autographa gamma</i> (LINNAEUS, 1758)	2	14	36	51	57	160	LC
29	<i>Abrostola triplasia</i> (LINNAEUS, 1758)	–	–	–	1	7	8	LC
30	<i>Emmelia trabealis</i> (SCOPOLI, 1763)	22	22	53	171	404	672	LC
31	<i>Acontia lucida</i> (HUFNAGEL, 1766)	2	1	1	5	9	18	LC
32	<i>Protodeltode pygarga</i> (HUFNAGEL, 1766)	–	1	–	–	1	2	LC
33	<i>Eublemma purpurina</i> (DENIS&SCHIFFERMULLER, 1775)	1	–	–	–	1	1	LC
34	<i>Cucullia umbratica</i> (LINNAEUS, 1758)	–	2	–	–	–	2	LC
35	<i>Calophasia lunula</i> (HUFNAGEL, 1766)	–	–	1	1	–	2	LC
36	<i>Calophasia opalina</i> (ESPER, 1793)	–	4	–	2	–	6	VU
37	<i>Amphipyra berbera</i> (RUNGS, 1949)	–	–	–	–	1	1	LC
38	<i>Mycteroplus puniceago</i> (BOISDUVAL, 1840)	–	4	–	–	–	4	VU

Nr. crt.	Species	2004	2005	2008	2009	2010	No. Indiv	Red List
39	<i>Protoschinia scutosa</i> (DENIS&SCHIFFERMULLER, 1775)	–	4	2	3	6	15	LC
40	<i>Heliothis viriplaca viriplaca</i> (HUFNAGEL, 1766)	1	3	–	–	–	4	LC
41	<i>Heliothis maritima</i> (GRASLIN, 1855)	–	–	–	–	4	4	LC
42	<i>Heliothis peltigera</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	11	–	11	LC
43	<i>Helicoverpa armigera armigera</i> (HUBNER, 1808)	2	18	41	42	39	142	LC
44	<i>Pyrrhia umbra</i> (HUFNAGEL, 1766)	–	1	–	1	–	2	LC
45	<i>Elaphria venustula</i> (HUBNER, 1790)	–	1	–	–	–	1	LC
46	<i>Caradrina morpheus</i> (HUFNAGEL, 1766)	–	–	5	2	6	13	LC
47	<i>Platyperigea kadenii</i> (FREYER, 1863)	1	1	24	10	3	39	NT
48	<i>Paradrina clavipalpis</i> (SCOPOLI, 1763)	–	1	1	14	6	22	LC
49	<i>Hoplodrina blanda</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	3	2	4	9	LC
50	<i>Hoplodrina ambigua</i> (DENIS&SCHIFFERMULLER, 1775)	5	38	210	65	187	505	LC
51	<i>Charanicha trigrammica</i> (HUFNAGEL, 1766)	–	1	24	5	10	40	LC
52	<i>Athetis gluteosa</i> (TREITSCHKE, 1835)	1	1	–	–	–	2	NT
53	<i>Athetis furvula</i> (HUBNER, 1808)	1	–	–	–	1	2	NT
54	<i>Dypterigia scabriuscula</i> (LINNAEUS, 1758)	–	–	–	1	5	6	LC
55	<i>Rusina ferruginea</i> (ESPER, 1785)	–	–	1	–	–	1	LC
56	<i>Talpophila matura</i> (HUFNAGEL, 1766)	–	–	–	1	–	1	LC
57	<i>Trachea atriplicis</i> (LINNAEUS, 1758)	–	10	2	6	8	26	LC
58	<i>Phlogophora meticulosa</i> (LINNAEUS, 1758)	–	–	–	5	2	7	LC
59	<i>Ipimorpha retusa</i> (LINNAEUS, 1761)	–	–	2	–	1	3	LC
60	<i>Ipimorpha subtusa</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	–	3	3	LC
61	<i>Enargia paleacea</i> (ESPER, 1788)	–	–	1	–	–	1	LC
62	<i>Enargia abluta</i> (HUBNER, 1808)	–	–	3	1	–	4	EN
63	<i>Parastichtis suspecta</i> (HUBNER, 1817)	–	–	–	1	–	1	NT
64	<i>Parastichtis ypsilon</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	3	27	30	LC
65	<i>Cosmia diffinis</i> (LINNAEUS, 1767)	–	–	–	2	2	4	NT
66	<i>Cosmia pyralina</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	1	3	1	5	LC
67	<i>Cosmia trapezina</i> (LINNAEUS, 1758)	–	–	5	–	13	18	LC
68	<i>Apamea monoglypha</i> (HUFNAGEL, 1766)	–	–	–	–	1	1	LC
69	<i>Apamea anceps</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	5	–	14	19	LC
70	<i>Apamea scolopacina</i> (ESPER, 1788)	–	–	–	1	–	1	LC
71	<i>Oligia strigilis</i> (LINNAEUS, 1758)	–	2	–	4	–	6	LC
72	<i>Oligia versicolor</i> (BORKHAUSEN, 1792)	–	3	6	25	19	53	LC
73	<i>Mesoligia furuncula</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	2	3	–	5	LC
74	<i>Mesoligia literosa</i> (HAWORTH, 1809)	–	–	1	–	–	1	NT
75	<i>Mesapamea secalis</i> (LINNAEUS, 1758)	–	1	1	1	4	7	LC
76	<i>Photodes minima</i> (HAWORTH, 1809)	–	–	–	1	–	1	NT
77	<i>Luperina testacea</i> (DENIS&SCHIFFERMULLER, 1775)	–	3	13	21	–	37	LC
78	<i>Rhizedra lutos</i> (HUBNER, 1803)	–	–	–	1	–	1	NT
79	<i>Amphipoea fucosa</i> (FREYER, 1830)	–	–	27	–	–	27	NT

Nr. crt.	Species	2004	2005	2008	2009	2010	No. Indiv	Red List
80	<i>Nonagria typhae</i> (THUNBERG, 1784)	–	–	1	–	–	1	NT
81	<i>Archanara neurica</i> (HUBNER, 1790)	–	–	1	–	–	1	EN
82	<i>Archanara dissoluta</i> (TREITSCHKE, 1835)	–	–	2	–	3	5	EN
83	<i>Archanara sparganii</i> (ESPER, 1790)	1	–	–	–	–	1	NT
84	<i>Hadula trifolii</i> (HUFNAGEL, 1766)	3	18	65	49	126	261	LC
85	<i>Lacanobia w-latinum</i> (HUFNAGEL, 1766)	–	9	7	25	18	59	LC
86	<i>Lacanobia suas</i> (DENIS&SCHIFFERMULLER, 1775)	–	5	–	–	–	5	LC
87	<i>Lacanobia oleracea</i> (LINNAEUS, 1758)	–	13	9	1	33	56	LC
88	<i>Lacanobia blenna</i> (HUBNER, 1824)	1	1	–	–	–	2	VU
89	<i>Sideritis turbida</i> (ESPER, 1790)	–	–	–	1	–	1	VU
90	<i>Hecatera dysodea</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	–	1	1	LC
91	<i>Mythimna turca</i> (LINNAEUS, 1761)	–	6	–	1	–	7	LC
92	<i>Mythimna straminea</i> (TREITSCHKE, 1825)	–	–	2	1	–	3	NT
93	<i>Mythimna vitellina</i> (HUBNER, 1808)	–	1	13	45	45	104	LC
94	<i>Mythimna unipuncta</i> (HAWORTH, 1809)	–	–	–	2	28	31	LC
95	<i>Mythimna albipuncta</i> (DENIS&SCHIFFERMULLER, 1775)	–	5	13	16	–	34	LC
96	<i>Mythimna congrua</i> (HUBNER, 1817)	–	3	7	15	13	38	VU
97	<i>Mythimna l-album</i> (LINNAEUS, 1761)	–	2	16	23	18	59	LC
98	<i>Leucania comma</i> (LINNAEUS, 1761)	–	–	1	1	–	2	LC
99	<i>Leucania obsoleta</i> (HUBNER, 1803)	–	3	–	–	1	4	LC
100	<i>Panolis flammea</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	1	–	1	VU
101	<i>Orthosia incerta</i> (HUFNAGEL, 1766)	1	8	5	21	59	94	LC
102	<i>Orthosia cerasi</i> (FABRICIUS, 1775)	–	–	–	–	18	18	LC
103	<i>Orthosia populeti</i> (FABRICIUS, 1781)	–	–	–	5	–	5	NT
104	<i>Orthosia gracilis</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	–	–	4	4	LC
105	<i>Orthosia opima</i> (HUBNER, 1809)	–	–	–	2	–	2	NT
106	<i>Orthosia gothica</i> (LINNAEUS, 1758)	–	–	–	16	21	37	LC
107	<i>Anorthoa munda</i> (DENIS&SCHIFFERMULLER, 1775)	–	1	–	–	1	2	LC
108	<i>Egira conspicularis</i> (LINNAEUS, 1758)	–	3	5	24	45	77	LC
109	<i>Athetmia centrigo</i> (HAWORTH, 1809)	–	–	–	1	–	1	NT
110	<i>Xanthia icteritia</i> (HUFNAGEL, 1766)	–	–	1	4	–	5	LC
111	<i>Xanthia gilvago</i> (DENIS&SCHIFFERMULLER, 1775)	1	–	3	–	–	4	NT
112	<i>Xanthia ocellaris</i> (BORKHAUSEN, 1792)	–	–	1	9	–	10	NT
113	<i>Agrochola litura</i> (LINNAEUS, 1761)	2	–	19	34	–	55	LC
114	<i>Agrochola lota</i> (CLERK, 1759)	–	–	–	1	–	1	LC
115	<i>Conistra rubiginosa</i> (SCOPOLI, 1763)	–	–	1	5	2	8	LC
116	<i>Lithophane ornithopus ornithopus</i> (HUFNAGEL, 1766)	–	–	–	1	–	1	LC
117	<i>Eupsilia transversa</i> (HUFNAGEL, 1766)	–	1	2	13	–	16	LC
118	<i>Dichonia convergens</i> (DENIS&SCHIFFERMULLER, 1775)	–	–	1	–	–	1	NT
119	<i>Axylia putris</i> (LINNAEUS, 1761)	–	–	–	3	–	3	LC
120	<i>Ulochlena hirta</i> (HUBNER, 1813)	–	17	1	3	8	29	VU
121	<i>Ochropleura plecta</i> (LINNAEUS, 1761)	–	6	–	3	6	15	LC

Nr. crt.	Species	2004	2005	2008	2009	2010	No. Indiv	Red List
122	<i>Noctua pronuba</i> (LINNAEUS, 1758)	–	–	23	23	12	58	LC
123	<i>Noctua orbona</i> (HUFNAGEL, 1766)	–	1	–	5	–	6	LC
124	<i>Noctua interposita</i> (HUBNER, 1790)	–	–	1	8	4	13	LC
125	<i>Noctua comes</i> (HUBNER, 1813)	–	–	–	–	1	1	LC
126	<i>Noctua fimbriata</i> (SCHREBER, 1759)	–	–	10	14	14	38	LC
127	<i>Noctua janthina</i> (DENIS&SCHIFFERMULLER, 1775)	–	1	2	4	15	22	NT
128	<i>Graphiphora augur</i> (FABRICIUS, 1775)	–	–	–	–	1	1	NT
129	<i>Xestia c-nigrum</i> (LINNAEUS, 1758)	–	21	54	39	40	154	LC
130	<i>Xestia xantographa</i> (DENIS&SCHIFFERMULLER, 1775)	–	1	15	83	–	99	LC
131	<i>Cerastis rubricosa</i> (DENIS&SCHIFFERMULLER, 1775)	–	5	–	21	14	40	LC
132	<i>Cerastis leucographa</i> (DENIS&SCHIFFERMULLER, 1775)	–	1	–	–	–	1	NT
133	<i>Euxoa aquilina</i> (DENIS&SCHIFFERMULLER, 1775)	1	–	–	–	–	1	LC
134	<i>Euxoa hastifera pomazensis</i> (KOVACS, 1952)	–	–	9	4	4	17	EN
135	<i>Agrotis crassa</i> (HUBNER, 1803)	–	2	4	5	29	40	VU
136	<i>Agrotis syricola</i> (BERIO, 1936)	–	–	–	3	4	7	VU
137	<i>Agrotis ypsilon</i> (HUFNAGEL, 1766)	3	2	–	4	31	40	LC
138	<i>Agrotis exclamationis</i> (LINNAEUS, 1758)	–	12	31	101	68	212	LC
139	<i>Agrotis segetum</i> (DENIS&SCHIFFERMULLER, 1775)	6	6	35	21	6	74	LC
140	<i>Earias clorana</i> (LINNAEUS, 1761)	–	–	17	2	4	23	LC
141	<i>Earias vernana</i> (FABRICIUS, 1787)	1	6	4	7	16	34	NT
	Total	4814						

EN = endangered species, VU = vulnerable species, NT = near threatened species, LC = least concern species.

Conclusions

- In The Botanical Garden Galați were identified 141 noctuid Lepidoptera species.
- Some species are included in the Red List categories. Species like *Enargia abluta*, *Archanara neurica*, *Archanara dissoluta*, *Euxoa hastifera pomazensis* are classified as endangered species.
- 6 species are new for the nocturnal lepidopterofauna of Moldova (Romania): *Macrochilo cribrumalis* (Hübner, 1793), *Enargia abluta* (Hübner 1880), *Archanara neurica* (Hübner 1790), *Mythimna unipuncta* (Haworth 1809), *Mythimna congrua* (Hübner 1817), *Agrotis syricola* (Berio 1936).
- 7 species are mentioned only in a few localities in Romania: *Drasteria caucasica* (Kolenati 1846), *Catephia alchymista* (Denis & Schiffermüller 1775), *Calyptra thalictri* (Borkhausen 1790), *Eutelia adalatrix* (Hübner 1813), *Mycteroplus puniceago* (Boisduval 1840), *Ulochlaua hirta* (Hübner 1813), *Euxoa hastifera pomazensis* (Kovács 1952).
- Even if the species richness isn't as high as in a natural habitat, however the study demonstrates that an urban ecosystem can offer optimal conditions for feeding and reproduction for this species.

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LEPIDOPTERE NOCTUIDE IDENTIFICATE ÎNTR-UN ECOSISTEM INTRAURBAN – GRĂDINA BOTANICĂ GALAȚI

(rezumat)

Lucrarea de față este rezultatul a 5 ani de studiu (2004, 2005, 2008, 2009 și 2010) desfășurat într-un ecosistem urban și anume în Grădina Botanică Galați. Zona studiată se află situată intravilan, aproape de confluența Dunării cu Siretul. Rezultatele obținute demonstrează importanța unui ecosistem urban în conservarea lepidopterofaunei nocturne dintr-un oraș puternic industrializat precum Galațiul. În urma cercetărilor au fost identificate 141 de specii, ce fac parte din familia Noctuidae și care reprezintă 22,8% din totalul speciilor de noctuide citate pe teritoriul României. Studiul a urmărit întreaga faună de lepidoptere nocturne din zonă (Cristescu 2007–2008, Cristescu 2010), în lucrarea de față fiind abordată doar familia Noctuidae.

SYSTEMATIC CHECK LIST FOR THE COLLECTION OF BIRDS PARTIAL SKELETONS IN MUREȘ COUNTY MUSEUM, NATURAL SCIENCE DEPARTMENT

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Abstract: This paper presents the history and the present of birds partial skeletons collection of the Târgu-Mureș Natural Science Museum. The most important data are ordered in a systematic check list. The collection is comprised by 428 specimens belonging to 135 species of birds. Those have been collected by de collectors (including the museum employees) from 10 counties and 101 locations in the country (only 2 pieces. are collected from Hungary). A single donation has been received from Mr. Szabó József, containing 23 preserved specimens. The remaining 395 partial skeletons have been preserved by author, with the exception of 10 pieces preserved by other Natural Sciences Museum's employees.

This collection has been put together with the purpose of determining, through comparacy, the remaining of birds of prey food, determining electrocuted birds, and determining poached birds, as well as using them for compared anatomical studies of the class Aves.

Keywords: birds, partial skeletons collection, check list, Mureș County Museum, Natural Sciences Department.

The establishment of the ornithological collection was initiated by main museologist Kónya István (16.01.1926 – 13.02.2003), who worked in the museum between 1952 – 1986. The first naturalized specimens were bought from the preparation laboratory A.G.V.P.S. Bucharest, and later from a private preparatory from Sângeorgiu de Mureș, Fülöp Iuliu (85 ex), and other 20 pieces being received from unknown owners.

I was hired by this institution in 1967 and I work here until present (2011, April) as a restaurateur at the department of Natural Sciences. In the past 44 years we have managed to collect (without the use of the fire arm held in the Museum possession), over 300 ornithological pieces, and obtain as unprepared donations 300 pieces. From this number I have prepared 517 as skins, or naturalized them [29]. Apart from the received specimens we have received many injured birds, deteriorated, that we could not save for the dermoplastic collection.

Being an amateur ornithologist as well, I had the opportunity to access scientific work that has touched the subject of food composition for diurnal and nocturnal birds of prey, looking at bones remaining. I realized that the skinned bodies that were put aside could be saved as partial skeletons, for determining what bones comprised the meal of the bird of prey. From that point on I prepared all the bodies remained after naturalization, even the damaged ones. (Therefore, the data from the bird check list correspond only partially to those in the collection inventory, published in the museum annuary).

The first time I have prepared only the stern, and then I continued with the shoulder griddle and pelvic belt. I would have stopped here, but the reality of the bird life has proven to be different than my planning, showing me that even if the man makes a plan, the nature is the one taking the ultimate decision.

I have discovered in time some bones, naturally suttured, and I knew that this is something valuable. I have prepared those components of the partial skeleton as well (femur, tibia, humerus etc.) hoping that someone with more expertise will, at one point, use those for future research [12, 14].

Aside from the pieces collected by hunters there are many birds that were collected after car accidents, that died after flying in mirrored windows, smokes from tall buildings or electrical wires. The best example is this of the hawk (*Accipiter nisus*). This species is rarely taken down by hunters. Most of the 17 specimens held by the museum were trapped after hunting a pray in a human environment.

I have received a few specimens from the Zoological Park in Târgu-Mureș, as well as from a bird of prey grower from Lodroman. The species *Falco biarmicus* is not customary to the area, they have been brought from Germany, from growers, and it is originally from the Mediterranean areal.

This collection can serve for:

- comparative anatomy studies intra and inter specific [7],
- determining birds of prey trophic remains,
- determining the electrocuted and rotting birds found under high and medium voltage poles to establish the exact impact this has on reducing the bird populations,
- to determine the poached birds, plucked to avoid being recognized, in order to be taken across the border unlawfully,
- it is also an anatomical-pathological proof of existing species in a known habitat and time frame.

I think that a separated catalog of osteology (symbol S = skeletons) asides from the catalogue of birds prepared in skins (naturalized or skins) (symbol A = aves) is more useful for those interested in research as well as for preservers, because the two collections necessitate different preservation treatments. (microclimate, dezinsection, storage).

The species classification was made by the multilingual Dictionary of bird species in Romania [17], the Bird from Romania Nomenclatory [23] and by the European Fauna [30]. I am convinced that neither of them is valid in time due to the continuous development of molecular biology, that brings modifications to bird's taxonomy, accepted or ignored by ornithologists. From the statistical classification this must be taken as an accurate representation of the present time.

From the statistical analysis of data we can derive the following:

- The collection consists of 428 partial skeletons, representing 135 species of birds;
- 100 pieces come from collectors;
- 163 pieces have been collected by the museum staff;
- A single donation of prepared pieces consisting of 23 partial skeletons was received from Mr. Szabo József. The remaining 395 were prepared by the author, and 10 parts by other colleagues;
- The specimens were collected within the range of 101 localities in 10 counties: Alba, Arad, Bistrița-Năsăud, Bihor, Cluj, Constanța, Harghita, Mureș, Sibiu and Tulcea.

Two specimens come from Hungary.

I would like to mention that some of this collection was studied by biology Professor Horváth Szabolcs, and the work was used towards obtaining his degree I [7].

Table 1: The list of species

Crt. No	Species	No of Specimens	Crt. No	Species	No of Specimens
1	<i>Accipiter gentilis</i>	6	69	<i>Gavia arctica</i>	4
2	<i>Accipiter nisus</i>	17	70	<i>Gavia stellata</i>	2
3	<i>Acrocephalus schoenobaenus</i>	1	71	<i>Ixobrychus minutus</i>	3
4	<i>Alcedo atthis</i>	4	72	<i>Lanius excubitor</i>	12
5	<i>Anas acuta</i>	4	73	<i>Larus canus</i>	2
6	<i>Anas clypeata</i>	1	74	<i>Larus michahellis</i>	1
7	<i>Anas crecca</i>	6	75	<i>Larus minutus</i>	1
8	<i>Anas penelope</i>	2	76	<i>Larus ridibundus</i>	14
9	<i>Anas platyrhynchos</i>	3	77	<i>Limosa limosa</i>	1
10	<i>Anas querquedula</i>	1	78	<i>Locustella luscinioides</i>	2
11	<i>Anser albifrons</i>	1	79	<i>Loxia curvirostra</i>	1
12	<i>Anser fabalis</i>	2	80	<i>Lymnocyptes minimus</i>	1
13	<i>Anthus pratensis</i>	1	81	<i>Mergus serrator</i>	1
14	<i>Anthus spinoletta</i>	2	82	<i>Motacilla alba</i>	1
15	<i>Apus apus</i>	1	83	<i>Nucifraga caryocatactes</i>	1
16	<i>Aquila pomarina</i>	1	84	<i>Nycticorax nycticorax</i>	2
17	<i>Ardea cinerea</i>	3	85	<i>Oenanthe oenanthe</i>	1
18	<i>Asio otus</i>	13	86	<i>Otus scops</i>	1
19	<i>Athene noctua</i>	8	87	<i>Parus cristatus</i>	1
20	<i>Aythya ferina</i>	3	88	<i>Parus major</i>	2
21	<i>Aythya fuligula</i>	2	89	<i>Parus palustris</i>	3
22	<i>Aythya marila</i>	1	90	<i>Passer domesticus</i>	1
23	<i>Aythya nyroca</i>	2	91	<i>Passer montanus</i>	2
24	<i>Bombycilla garrulus</i>	3	92	<i>Pernis apivorus</i>	1
25	<i>Botaurus stellaris</i>	2	93	<i>Phalacrocorax carbo</i>	1
26	<i>Bubo bubo</i>	2	94	<i>Phalacrocorax pygmaeus</i>	4
27	<i>Buteo buteo</i>	16	95	<i>Phasianus colchicus</i>	5
28	<i>Buteo lagopus</i>	2	96	<i>Philomachus pugnax</i>	3
29	<i>Calandrella brachydactyla</i>	1	97	<i>Phylloscopus sibilatrix</i>	1
30	<i>Calidris alpina</i>	4	98	<i>Pica pica</i>	10
31	<i>Calidris minuta</i>	1	99	<i>Picus canus</i>	5
32	<i>Carduelis cannabina</i>	4	100	<i>Picus viridis</i>	5
33	<i>Carduelis carduelis</i>	2	101	<i>Plegadis falcinellus</i>	2
34	<i>Carduelis chloris</i>	2	102	<i>Pluvialis apricaria</i>	1
35	<i>Carduelis flammea</i>	2	103	<i>Pluvialis squatarola</i>	1
36	<i>Carduelis flavirostris</i>	4	104	<i>Podiceps cristatus</i>	1
37	<i>Carduelis spinus</i>	1	105	<i>Podiceps grisegena</i>	3
38	<i>Chlidonias leucopterus</i>	1	106	<i>Podiceps nigricollis</i>	4
39	<i>Ciconia ciconia</i>	1	107	<i>Pyrrhula pyrrhula</i>	1
40	<i>Cinclus cinclus</i>	9	108	<i>Rallus aquaticus</i>	5
41	<i>Circus cyaneus</i>	2	109	<i>Regulus regulus</i>	2
42	<i>Coccothraustes coccothraustes</i>	6	110	<i>Saxicola rubetra</i>	1
43	<i>Corvus corax</i>	3	111	<i>Scolopax rusticola</i>	5
44	<i>Corvus cornix</i>	6	112	<i>Serinus serinus</i>	1
45	<i>Corvus frugilegus</i>	3	113	<i>Somateria mollissima</i>	1
46	<i>Corvus monedula</i>	6	114	<i>Stercorarius pomarinus</i>	1
47	<i>Cuculus canorus</i>	1	115	<i>Sterna caspia</i>	1
48	<i>Cygnus cygnus</i>	2	116	<i>Sterna hirundo</i>	1
49	<i>Cygnus olo</i>	2	117	<i>Streptopelia decaocto</i>	1

Crt. No	Species	No of Specimens	Crt. No	Species	No of Specimens
50	<i>Dendrocopos leucotos</i>	1	118	<i>Strix aluco</i>	6
51	<i>Dendrocopos major</i>	3	119	<i>Strix uralensis</i>	5
52	<i>Dendrocopos medius</i>	2	120	<i>Sturnus vulgaris</i>	8
53	<i>Dendrocopos minor</i>	1	121	<i>Sylvia atricapilla</i>	1
54	<i>Dromaius novahollandiae</i>	1	122	<i>Sylvia curruca</i>	1
55	<i>Dryocopus martius</i>	3	123	<i>Tachybaptus ruficollis</i>	2
56	<i>Emberiza calandra</i>	2	124	<i>Tachymarptis melba</i>	1
57	<i>Emberiza citrinella</i>	11	125	<i>Tadorna tadorna</i>	2
58	<i>Emberiza schoeniclus</i>	3	126	<i>Tetrao urogallus</i>	12
59	<i>Falco biarmicus</i>	4	127	<i>Tringa glareola</i>	1
60	<i>Falco peregrinus</i>	1	128	<i>Turdus iliacus</i>	1
61	<i>Falco subbuteo</i>	1	129	<i>Turdus philomelos</i>	1
62	<i>Falco tinnunculus</i>	2	130	<i>Turdus pilaris</i>	6
63	<i>Fringilla montifringilla</i>	3	131	<i>Turdus torquatus</i>	2
64	<i>Fulica atra</i>	1	132	<i>Turdus viscivorus</i>	2
65	<i>Galerida cristata</i>	1	133	<i>Tyto alba</i>	2
66	<i>Gallinago gallinago</i>	3	134	<i>Upupa epops</i>	1
67	<i>Gallinula chloropus</i>	2	135	<i>Vanellus vanellus</i>	10
68	<i>Garrulus glandarius</i>	20			
TOTAL 135 species					

Specimens have been preserved by:

Kónya István, (1 piece) inv. no 177,

Kónya István jun., (8 pieces) inv. no 51, 54, 104, 110, 111, 112, 115, 116,

Sárkány Kiss Andrei, (1 piece) inv. no 114,

Szabó József, (23 pieces) inv. no 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207,

Szombath Zoltán, all others (395 pieces).

List of locations

- | | |
|---------------------------------|------------------------------|
| 1. 6 Martie – TL, 3 ex | 17. Cheile Turzii – CJ, 1 ex |
| 2. Acățari – MS, 1 ex | 18. Chibed – MS, 1 ex |
| 3. Adrianu Mare – MS, 1 ex | 19. Chinari – MS, 10 ex |
| 4. Aluniș – MS, 2 ex | 20. Chirileu – MS, 2 ex |
| 5. Atid – HR, 1 ex | 21. Cipău – MS, 5 ex |
| 6. Band – MS, 1 ex | 22. Cluj-Napoca – CJ, 1 ex |
| 7. Berghia – MS, 2 ex | 23. Cornești – MS, 1 ex |
| 8. Bilbor – Corbu – HR, 1 ex | 24. Corunca – MS, 1 ex |
| 9. Bistra-Mureșului – MS, 2 ex | 25. Crăiești – MS, 1 ex |
| 10. Borzont – HR, 2 ex | 26. Cristești – MS, 17 ex |
| 11. Botorca – MS, 1 ex | 27. Cuci – MS, 1 ex |
| 12. Buiu Mic – MS, 1 ex | 28. Cuieșd – MS, 1 ex |
| 13. Câmpenița – MS, 1 ex | 29. Delta Dunării – TL, 2 ex |
| 14. Căpușu de Câmpie – MS, 1 ex | 30. Desag – HR, 1 ex |
| 15. Cefa – BH, 1 ex | 31. Dumbrăvioara – MS, 3 ex |
| 16. Cerghid – MS, 3 ex | 32. Dupuș – SB, 2 ex |

- | | |
|--|-------------------------------------|
| 33. Eforie-Sud – CT, 1 ex | 68. Petelea – MS, 1 ex |
| 34. Ercea – MS, 2 ex | 69. Praid – HR, 7 ex |
| 35. Eremitu (v. Seaca) – MS, 1 ex | 70. Râciu – MS, 5 ex |
| 36. Ernei – MS, 2 ex | 71. Răstolița – MS, 5 ex |
| 37. Fântânele – MS, 1 ex | 72. Reghin – MS, 1 ex |
| 38. Fărăgău – MS, 8 ex | 73. Remetea – MS, 1 ex |
| 39. Găiești – MS, 2 ex | 74. Săbed – MS, 15 ex |
| 40. Gălăoaia (mți.Călimani) – MS, 1 ex | 75. Săcădat (Sovata) – MS, 2 ex |
| 41. Gălești – MS, 1 ex | 76. Sâncraiu de Mureş – MS, 2 ex |
| 42. Gheorghe Doja – MS, 1 ex | 77. Sângeorgiu de Mureş – MS, 11 ex |
| 43. Glodeni – MS, 13 | 78. Sânpaul – HR, 2 ex |
| 44. Gornești – MS, 3 ex | 79. Sânpaul – MS, 2 ex |
| 45. Grușor – MS, 1 ex | 80. Sântioana de Mureş – MS, 7 ex |
| 46. Gurghiu – MS, 2 ex | 81. Șilea Nirajului – MS, 1 ex |
| 47. Hăghimașul Mare – HR, 5 ex | 82. Șimand – AR, 2 ex |
| 48. Hărânglab – MS, 2 ex | 83. Socodor – AR, 2 ex |
| 49. Iceland – MS, 3 ex | 84. Someșeni – CJ, 1 ex |
| 50. Iernut – MS, 65 ex | 85. Sovata – MS, 2 ex |
| 51. Jeica – BN, 1 ex | 86. Suveica – MS, 1 ex |
| 52. Mureş county – MS, 2 ex | 87. Szolnok – HU, 1 ex |
| 53. Kiskunlacháza – Hu, 1 ex | 88. Tâmpa – MS, 1 ex |
| 54. Lăpușna – MS, 1 ex | 89. Târgu-Mureş – MS, 73 ex |
| 55. Lechința – MS, 2 ex | 90. Târgu-Mureş – Zoo – MS, 4 ex |
| 56. Livezeni – MS, 3 ex | 91. Târnăveni – MS, 1 ex |
| 57. Lodroman – AB, 5 ex | 92. Tăureni – MS, 2 ex |
| 58. Călimani Mountains – MS, 1 ex | 93. Tirimia – MS, 6 ex |
| 59. Mediaș – SB, 2 ex | 94. Tofalău – MS, 3 ex |
| 60. Miercurea Nirajului – MS, 1 ex | 95. Toldal – MS, 9 ex |
| 61. Morești – MS, 23 ex | 96. Ungheni – MS, 2 ex |
| 62. Nazna – MS, 1 ex | 97. Urmeniș – BN, 1 ex |
| 63. Odorheiu Secuiesc – HR, 3 ex | 98. Vadu – CT, 1 ex |
| 64. Onuca – MS, 1 ex | 99. Vălenii – MS, 3 ex |
| 65. Păingenii – MS, 5 ex | 100. Vidrasău – MS, 4 ex |
| 66. Periș – MS, 1 ex | 101. Voivodeni – MS, 5 ex |
| 67. Petea – MS, 1 ex | |

TOTAL

101 localities

428 pieces

Specimens origins (with inventory no)

- | | |
|--|---|
| 1. Antal István, 372, | 6. Bíró Albert, 61, |
| 2. Antal László, 347, 390, 271, 318, 316, 329, 397, | 7. Bogdán Jenő, 424, |
| 3. Ács János jun., 11, 72, 19, 36, | 8. Boros Gábor, 190, 198, 202, 186, 187, 191, 192, 193, 185, 188, 189, (11 ex.) |
| 4. Babos Ferenc, 90, | 9. Boros György, 178, 278, |
| 5. Berekméri András, 17, 28, 30, 56, 69, 83, 33, 38, 70, 82, 183, (11 ex.) | 10. Bota Liviu, 6, |
| | 11. Botoș Daniela, (museum) 240, |

12. Brăteanu Mihail, 92, 384, 393, 395, 400, 405, 409, 412, 414,
13. Brustur Ioan, 7, (44 ex.)
14. Cantor Ileana, (museum) 139, 51. Körtesi Alexandru, 392,
15. Cioloboc Ioan, (museum) 20, 143, 242, 52. Kulcsár László, 317, 328,
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16. Ciolomic Dorin, 263, 312, 54. Lupa, 211,
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18. Daróczi Szilárd, 220, 238, 244, 255, 57. Mikó István, 53, 68,
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19. Dávid András, 37, 59. Moldovan Iuliu, 182,
20. Dogar Ioan, 425, 60. Mózes Ferenc, 121,
21. Dumitrescu Ștefan, 62, 61. Murvai Sámuel, 4,
22. Farcádi Domokos, 146, 62. Negruți-Fekete Octavian, 209,
23. Fodor István, 394, 63. Német János, 232,
24. Frunza Victor, 117, 64. Orbán Albert, (museum) 180, 259, 270,
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26. Ganea Ștefan, 237, 65. Pál Béla, 91,
27. Gliga Ioan, 119, 66. Pap Árpád, 280,
28. Godan Elena, (museum) 293, 67. Pap Péter, 251, 258,
29. Gombos Atilla, 158, 160, 165, 301, 68. Papp Tamás, 210, 223, 228, 229, 241,
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30. Grădina Zoo, 26, 426, 70. Pucleanu Călin, 268,
31. Gyarmati János, 88, 71. ROMSILVA, 267,
32. Gyékény Gertrud, 298, 72. Sándor Atilla, 391,
33. Gyéresi Árpád, 269, 73. Sárkány Atilla, 50, 144, 179, 305,
34. György László, 164, 74. Sárkány Kiss Andrei (museum) 32, 35,
35. Halasi Károly, 265, 266, 66, 79, 80, 89, 95, 97, 98, 99, 100, 102,
36. Han János (dr), 5, 123, 124, 128, 130, 131, 132, 133, 141,
37. Hîrșan Mircea, 15, 120, 308, 145, 147, 149, 150, 151, 169, 170, 239,
38. Horváth Sándor, 109, 273, 274, 276, 277, 281, 282, 283, 288,
39. Horváth Tibor, 224, 289, 290, 291, 303, 306, 309, 311, 320,
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41. Kolozsvári Puskás Sándor, 253, 356, 387, 401, 402, 403, 407, 419, 427,
42. Kalabér Ladislau, 113, 428, (61 ex.)
43. Kelemen Attila, 44, 156, 368, 75. Sárkány Péter, 415,
44. Kelemen Kálmán, 227, 76. Sinka Balogh Zoltán, 262,
45. Kelemen, 22, 48, 77. Szabó József, (donation) 9, 13, 173, 194,
46. Kerekes István, 233, 254, 195, 196, 197, 199, 200, 201, 203, 204,
47. Keszeg Arnold, 154, 245, 246, 247, 248, 205, 206, 207, 371, 375, 376, 378,
48. Kis Zoltán, 155, (19 ex. + 4 ex. Collected by different
49. Kohl István, 1, 2, people, prepared and donated by him)
50. Kónya István, (museum) 46, 51, 54, 65, 78. Szabó László, 230,
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83. Szilágyi Sándor, (museum) 275, 404, 406, 314, 315, 326, 331, 332, 333, 334, 342,
84. Szombath Aladár, 25, 34, 42, 57, 58, 63, 344, 346, 348, 357, 358, 359, 360, 361,
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85. Szombath István, 10, 12, 14, 27, 40, 45, 91. Tóth Miklós, 208,
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(40 ex.) 96. X.Y. (hunter), 64,
86. Szombath Péter, 396, 97. Zeitz R. – Kelemen M., 226,
87. Szombath Z. – Kónya I., (museum) 41, 98. Zeitz Robert, 256,
88. Szombath Zoltán, (museum) 16, 21, 96, 99. Zólyomi György, 8,
171, 181, 184, 221, 222, 257, 292, 299, 100. Zoo – Târgu-Mureş, 161, 162

The check list of birds partial skeletons from the collection of Mureş County Museum, Târgu-Mureş

Order Gaviiformes

Family Gaviidae

Gavia stellata (Pontoppidan)

Inv. no	sex	age	Collecting place	Date	Bones
14	♀	ad.	Iernut – MS	1983.11.09	c.s., c.p., st.
24	♀	ad.	Vidrasău – MS	1983.10.21	c.s., c.p., st., v.c. 4

Gavia arctica (Linnaeus)

10	♀	ad.	Iernut – MS	1983.10.13	c.s., c.p., st., v.c.5
11	♀	juv.	Glodeni – MS	1985.10.29	c.s., c.p., st.
12	♀	ad.	Iernut – MS	1983.10.13	c.s., c.p., st., v.c.6., v.d. 2
13	♀	ad.	Sânpaul – HR	1980.11.02	c.s., c.p., st., fe.1,

Order Podicipediformes

Family Podicipedidae

Tachybaptus ruficollis (Pallas)

170	♀	juv.	Iernut – MS	1983.10.27	c.s., c.p., st.
346	♀	juv.	Târgu-Mureş – MS	1968.07.18	st.
255	?	ad.	Cheile Turzii – CJ	2007.07.28	st., c.s., c.p., v.c.4, fe.1

***Podiceps cristatus* (Linnaeus)**

86	♂	juv.	Mureș county – MS	1975.11.24	c.s., s.t.
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***Podiceps grisegena* (Boddaert)**

32	♀	ad.	Iernut – MS	1983.10.27	c.s., c.p., st.,
33	♀	ad.	Cristești – MS	1985.04.14	c.s., c.p., st., v.c. 4
103	♂	ad.	Târgu-Mureș – MS	1973.03.16	st, co. 2

***Podiceps nigricollis* C. L. Brehm**

38	♂	ad.	Cristești – MS	1985.04.14	c.s., c.p., st.
122	♀	ad.	Iernut – MS	1983.10.27	c.s., c.p., st., v.c. 5
132	♀	juv.	Iernut – MS	1983.10.05	c.s., st.
284	♂	ad.	Sângeorgiu de Mureș – MS	1971.04.04	st.

Order Pelecaniformes**Family Phalacrocoracidae*****Phalacrocorax carbo* (Linnaeus)**

29	♀	imm	Eforie-Sud – CT	1993.01.15	c.s., c.p., st., v.c.5
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***Phalacrocorax pygmaeus* (Pallas)**

28	♂	juv.	6 Martie – TL	1984.11.30	c.s., c.p., st., v.c.3
30	♀	juv.	6 Martie – TL	1984.11.30	c.s., c.p., st., v.c. 5
160	♀	ad.	Morești – MS	1969.04.13	st.
236	♂	ad.	Glodeni – MS	1997.12.06	st., c.s., c.p., v.c.4., fe.2

Order Ciconiiformes**Family Ardeidae*****Botaurus stellaris* (Linnaeus)**

16	♂	ad.	Cipău – MS	1992.01.05	c.s., c.p., st., hu.1, ra.-cu.1, v.c.4
158	♂	ad.	Morești – MS	1970.02.01	st.

***Ixobrychus minutus* (Linnaeus)**

299	♀	juv.	Iernut – MS	1988.10.11	st., c.s.
345	♀	juv.	Fărăgău – MS	1975.11.16	hu.1.

***Nycticorax nycticorax* (Linnaeus)**

93	?	juv.	Tăureni – MS	1978.08.20	c.s., st.
135	♂	ad.	Morești – MS	1974.04.21	c.s., st.

***Ardea cinerea* Linnaeus**

67	?	juv.	Moreşti – MS	1980.09.12	c.s., st.
71	?	juv.	Moreşti – MS	1980.09.12	c.s., st., hu.
155	♂	imm	Glodeni – MS	1980.09.12	c.s., c.p., st., v.c. 4, fe. 1

Family Ciconiidae

***Ciconia ciconia* (Linnaeus)**

194	?	ad.	Târgu-Mureş – MS	1962.12.19	scalp
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Family Threskiornithidae

***Plegadis falcinellus* (Linnaeus)**

161	♀	juv.	Delta Dunării – TL	1971.11.05	st.
162	♂	juv.	Delta Dunării – TL	1971.11.13	st.

Order Anseriformes

Family Anatidae

***Cygnus olor* (Gmelin)**

1	?	ad.	Târgu-Mureş – Zoo – MS	1983.01.07	c.s., c.p., st., v.c. 7
2	♂	ad.	Târgu-Mureş – Zoo – MS	1984.01.25	c.s., c.p., st., v.c. 7., v.d 2

***Cygnus cygnus* (Linnaeus)**

25	♀	ad.	Ungheni – MS	1969.01.02	st., c.p., co.2, fu.
263	♀	ad.	Cipău – MS	1993.11.15	st., c.s., c.p., v.c.5

***Anser fabalis* (Latham)**

44	?	juv.	Iernut – MS	1971.11.24	st.,
423	♀	juv.	Aluniş – MS	1975.11.05	Ti.-ta.

***Anser albifrons* (Scopoli)**

8	♂	ad.	Cuci – MS	1983.10.28	c.s., c.p., st., v.c. 6
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***Tadorna tadorna* (Linnaeus)**

157	♀	ad.	Cipău – MS	1969.05.27	st.
422	♀	ad.	Cipău – MS	1969.05.27	hu.1.

***Anas penelope* Linnaeus**

27	♀	ad.	Iernut – MS	1983.11.15	c.s., c.p., st., v.c.5
42	♂	ad.	Nazna – MS	1980.03.15	c.s., st.

***Anas crecca* Linnaeus**

40	♀	ad.	Iernut – MS	1983.11.15	c.s., st.
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74	♀	ad.	Cristești – MS	1976.10.24	c.s., st.
75	♂	juv.	Morești – MS	1976.10.24	c.s., st., hu.1, ra.-cu.1.
133	♂	ad.	Iernut – MS	1983.11.15	c.s., st.
134	♂	ad.	Iernut – MS	1983.11.15	c.s., st.
285	♂	juv.	Iernut – MS	1971.10.24	st.

***Anas platyrhynchos* Linnaeus**

21	♂	ad.	Iernut – MS	1983.11.15	c.s., c.p., st., v.c.3
73	♀	ad.	Cristești – MS	1976.02.17	fu., fe.
136	♂	ad.	Fărăgău – MS	1977.03.11	c.s., st., hu. 1

***Anas acuta* Linnaeus**

19	♂	ad.	Voivodeni – MS	1983.03.15	c.s., st.
23	♂	ad.	Sântioana de Mureș – MS	1979.03.14	c.s., s.t.
36	♂	ad.	Voivodeni – MS	1983.03.15	c.s., st.
87	♀	ad.	Iernut – MS	1970.08.25	st.

***Anas querquedula* Linnaeus**

339	♂	ad.	Iernut – MS	1971.03.13	st.
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***Anas clypeata* Linnaeus**

76	♀	ad.	Căpușu de Câmpie – MS	1975.10.19	fu., sc. 2.
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***Aythya ferina* (Linnaeus)**

58	♂	ad.	Lechința – MS	1980.03.09	c.s., st.
66	♀	ad.	Târgu-Mureș – MS	1976.03.28	c.s., st.
159	♂	ad.	Iernut – MS	1971.03.11	st.

***Aythya nyroca* (Güldenstädt)**

57	♂	ad.	Lechința – MS	1980.03.09	c.s., st.
340	?	ad.	Iernut – MS	1971.03.12	st.

***Aythya fuligula* (Linnaeus)**

53	♂	ad.	Târgu-Mureș – MS	1975.04.15	c.s., st.
68	♂	ad.	Târgu-Mureș – MS	1975.04.18	c.s., st.

***Aythya marila* (Linnaeus)**

41	♀	ad.	Târgu-Mureș – MS	1973.10.24	c.s., st.
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***Somateria mollissima* (Linnaeus)**

9	♀	ad.	Sânpaul – HR	1984.09.22	c.s., c.p., st., v.c.7, v.d.8, fe.2
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***Mergus serrator* Linnaeus**

72	♀	ad.	Glodeni – MS	1985.10.29	c.s., s.t.
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Order Falconiformes**Family Accipitridae*****Pernis apivorus* (Linnaeus)**

185	?	ad.	Târgu-Mureş – MS	1963.08.24	scalp
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***Circus cyaneus* (Linnaeus)**

31	♂	ad.	Tâmpa – MS	1975.11.23	c.s., st.
166	♀	ad.	Iernut – MS	1971.10.24	st.

***Accipiter gentilis* (Linnaeus)**

15	♀	juv.	Jeica – BN	1977.08.30	c.s., c.p., st., fe.2, hu.1, v.c.6
190	♂	ad.	Târgu-Mureş – MS	1963.01.28	scalp
216	♀	imm	Râciu – MS	1997.02.09	st., c.s., c.p., v.c.6
217	♀	ad.	Râciu – MS	2004.02.07	st., c.s., c.p., v.c.7
218	♂	ad.	Chinari – MS	1999.12.12	st., c.s., c.p., v.c.6
219	♂	imm	Târgu-Mureş – MS	2007.01.18	st., c.s., c.p., v.c.6

***Accipiter nisus* (Linnaeus)**

37	♀	ad.	Atid – HR	1989.03.31	c.s., c.p., st., v.c. 5
39	♀	ad.	Sântioana de Mureş – MS	1990.12.27	c.s., c.p., st., v.c.5
92	♀	imm	Aluniş – MS	1975.11.29	c.s., st.
109	♀	ad.	Târgu-Mureş – MS	1978.02.20	c.s., c.p., st., v.p. 6
118	♀	ad.	Miercurea Nirajului – MS	1974.12.02	c.s., st.
119	♀	ad.	Râciu – MS	1975.02.18	c.s., st.
154	♀	ad.	Lodroman – AB	1992.12.22	c.s., c.p., st., v.c. 6
163	♀	ad.	Sângeorgiu de Mureş – MS	1971.03.04	st.
164	♀	ad.	Cuieşd – MS	1970.02.01	st.
183	♂	imm	Urmeniş – BN	1976.11.09	c.s., st.
184	♀	ad.	Sâncraiu de Mureş – MS	1969.04.18	st.
198	♂	ad.	Târgu-Mureş – MS	1963.01.21	scalp
202	♀	juv.	Târgu-Mureş – MS	1963.09.02	scalp
233	♀	ad.	Gheorghe Doja – MS	2000.03.11	st., c.s., c.p., v.c.4
234	♂	ad.	Adrianu Mare – MS	2006.12.21	st., c.s., c.p., v.c.5
235	♀	juv.	Odorheiu Secuiesc – HR	2003.09.16	st., c.s., c.p., v.c.5., fe.2
295	♂	imm	Târgu-Mureş – MS	2002.12.02	st., c.s.

***Buteo buteo* (Linnaeus)**

20	♀	ad.	Cerghid – MS	1988.07.05	sc., co.,
56	♀	ad.	Band – MS	1975.05.28	c.s., st.
61	♀	ad.	Vălenii – MS	1979.11.25	c.s., s.t.
62	♀	ad.	Corunca – MS	1977.01.08	c.s., s.t.
64	♂	ad.	Râciu – MS	1977.01.30	c.s., s.t.

65	♀	ad.	Glodeni – MS	1977.02.02	c.s., s.t., v.c.5
69	♀	ad.	Berghia –MS	1977.01.09	c.s., c.p., st., v.c. 5
70	♂	juv.	Săbed – MS	1976.10.10	c.s., c.p., st., v.c. 6
117	♀	ad.	Remetea – MS	1980.12.21	c.s., st.
186	♀	ad.	Târgu-Mureș – MS	1963.02.05	scalp
210	♀	ad.	Târgu-Mureș – MS	2000.01.21	st, c.s., c.p., v.c.7
211	♂	ad.	Tirimia – MS	1990.09.02	st, c.s., c.p., v.c.7
212	♀	ad.	Dupuș – SB	2004.02.01	st., c.s., c.p., v.c.5
213	♀	ad.	Dupuș – SB	2004.02.01	st., c.s., c.p., v.c.4
214	♂	ad.	Târgu-Mureș – MS	2004.01.16	st., c.s., c.p., v.c.6
215	♂	ad.	Mediaș – SB	2004.03.09	st., c.s., c.p., v.c.7., fe.2,

***Buteo lagopus* (Pontoppidan)**

34	♂	ad.	Câmpenița – MS	1980.02.17	c.s., st.
209	♂	ad.	Fântânele – MS	1996.03.30	st, c.s., c.p., v.c.6

***Aquila pomarina* C. L. Brehm**

18	♂	ad.	Săbed – MS	1979.05.02	c.s., st.
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Family Falconidae***Falco tinnunculus* Linnaeus**

121	♂	ad.	Morești – MS	1979.03.20	c.s., c.p., st., v.c. 7
293	♂	ad.	Sâncraiu de Mureș – MS	1988.05.06	st., c.s., c.p., v.c.6

***Falco subbuteo* Linnaeus**

120	♀	ad.	Vidrasău – MS	1983.09.10	c.s., c.p., v.c. 5
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***Falco biarmicus* Temminck**

245	♀	ad.	Lodroman – AB	1997.07.15	st., c.s., c.p., v.c.6
246	♂	imm	Lodroman – AB	1997.01.20	st., c.s., c.p., v.c.7
247	♂	imm	Lodroman – AB	1998.09.10	st., c.s., c.p., v.c.5
248	♀	ad.	Lodroman – AB	1998.12.11	st., c.s., c.p., v.c.7

***Falco peregrinus* Tunstall**

249	♂	imm	Vadu – CT	1999.10.05	st., c.s., c.p., v.c.6
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Order Struthioniformes**Family Dromaiidae*****Dromaius novaehollandiae* Latham**

426	♀	ad.	Târgu-Mureș – Zoo – MS	1990.09.23	st, c.s., c.p.
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Order Galliformes

Family Tetraonidae

Tetrao urogallus Linnaeus

3	♂	ad.	Răstolița – MS	1976.05.09	c.s., c.p., st., v.c. 2
4	♂	ad.	Gălăoaia (mți.Călimani) MS	1977.05.02	c.s., c.p., st., fe.1, v.c. 5
5	♂	ad.	Răstolița – MS	1977.05.04	c.s., c.p., st., v.c. 2
6	♂	ad.	Eremitu (v.Seaca) – MS	1990.05.07	st., co., fu.
7	♂	ad.	M.ții Călimani – MS	1974.04.30	c.s., st.
208	♂	ad.	Bilbor – Corbu – HR	1998.05.02	st, c.s., c.p.
264	♂	ad.	Praid – HR	2001.04.19	st., c.s., c.p., v.c.2, fe.2
265	♂	ad.	Praid – HR	2002.04.27	st., c.s., c.p., v.c.4, fe.2
266	♂	ad.	Praid – HR	2002.04.27	st., c.s., c.p., v.c.4, fe.2
267	♂	imm	Lăpușna – MS	2002.05.04	st., c.s., c.p., v.c.5, fe.2
268	♂	ad.	Sovata – MS	2003.05.05	st., c.s., c.p., v.c.5, fe.2
269	♂	ad.	Praid – HR	2004.05.01	st., c.s., c.p., v.c.3, fe.1

Family Phasianidae

Phasianus colchicus Linnaeus

43	♀	ad.	Săbed – MS	1979.04.10	c.s., st.
156	♂	ad.	Tirimia – MS	1971.12.12	st.
421	♂	ad.	Morești – MS	1983.01.23	hu.1.
425	♂	ad.	Râciu – MS	1974.12.29	hu., ra., ul.
201	♂	ad.	Târgu-Mureş – MS	1963.02.05	Scalp

Order Gruiformes

Family Rallidae

Rallus aquaticus Linnaeus

168	♂	ad.	Iernut – MS	1983.11.15	c.s., c.p., st., v.c. 4
169	♂	ad.	Iernut – MS	1983.11.15	c.s., st.
240	♂	ad.	Târgu-Mureş – MS	1997.10.15	st., c.s., c.p., v.c.3
241	♀	ad.	Târgu-Mureş – MS	2009.10.21	st, c.s., c.p., fe.2
372	♂	ad.	Someșeni – CJ	1976.02.09	st, c.s., c.p.

Gallinula chloropus (Linnaeus)

138	♂	ad.	Iernut – MS	1974.10.13	c.s., st.
286	♀	juv.	Cristești – MS	1974.10.05	st., fu., sc.2, co.1

Fulica atra Linnaeus

55	♂	ad.	Morești – MS	1976.10.24	c.s., st.
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Order Charadriiformes**Suborder Charadrii****Family Charadriidae*****Pluvialis apricaria* (Linnaeus)**

123	♂	juv.	Iernut – MS	1983.11.15	c.s., st.
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***Pluvialis squatarola* (Linnaeus)**

130	♂	ad.	Iernut – MS	1983.10.13	c.s., st.
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***Vanellus vanellus* (Linnaeus)**

95	♂	ad.	Fărăgău – MS	1980.03.20	c.s., st.,
100	♂	ad.	Iernut – MS	1983.10.05	c.s., st.
104	♂	ad.	Iernut – MS	1983.10.06	c.p., c.s., st.
110	♂	ad.	Iernut – MS	1983.10.06	c.s., c.p., st., v.p. 2
111	♀	juv.	Iernut – MS	1983.10.06	c.s., c.p., st., fe.2
112	♂	juv.	Iernut – MS	1983.10.06	c.s., c.p., st., fe.2
115	♂	ad.	Iernut – MS	1983.10.06	c.s., c.p., st., fe 2,
116	♀	ad.	Iernut – MS	1983.10.06	c.s., st.
167	♀	juv.	Iernut – MS	1983.10.06	c.s., c.p., st., v.c. 4
300	♂	ad.	Ernei – MS	1968.03.17	st.

Family Scolopacidae***Calidris minuta* (Leisler)**

292	♂	ad.	Iernut – MS	1983.10.06	st., c.s.
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***Calidris alpina* (Linnaeus)**

289	♀	ad.	Iernut – MS	1983.10.13	st, c.s., c.p.
290	?	ad.	Iernut – MS	1983.10.13	st, c.s., c.p.
291	♂	ad.	Iernut – MS	1983.10.06	st., c.s.
427	♂	ad.	Iernut – MS	1983.10.13	st., c.p., sc.1, co.1, fu.

***Philomachus pugnax* (Linnaeus)**

96	♂	ad.	Iernut – MS	1989.04.12	c.p., st., co.1., sc.2., fu., v.c 5.
124	♂	ad.	Iernut – MS	1983.10.06	c.s., c.p., st., v.c. 5
301	♀	ad.	Iernut – MS	1970.05.02	st, c.s., c.p.

***Lymnocyrtus minimus* (Brünnich)**

288	♂	ad.	Iernut – MS	1984.02.07	st, c.s., c.p.
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***Gallinago gallinago* (Linnaeus)**

126	♂	ad.	Iernut – MS	1983.11.15	c.s., st.
129	♂	ad.	Iernut – MS	1974.09.15	c.s., st.
287	♀	ad.	Iernut – MS	1974.10.14	st., fu., sc.1, co.2

***Scolopax rusticola* Linnaeus**

77	♂	ad.	Sântioana de Mureș – MS	1980.05	c.s., st.
78	♂	ad.	Sântioana de Mureș – MS	1980.05	c.s., st.
125	♂	ad.	Săbed – MS	1979.03.28	co. 1, sc. 1, st.
137	?	ad.	Săbed – MS	1977.10.30	co. 2, fu. 1, st.
424	♀	ad.	Săbed – MS	1979.04.29	Ti.-ta. (stîng.)

***Limosa limosa* (Linnaeus)**

94	♀	ad.	Iernut – MS	1970.05.02	c.s., c.p., st.
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***Tringa glareola* Linnaeus**

373	♀	ad.	Târgu-Mureș – MS	1974.04.26	st., c.s.
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Suborder Lari

Family Stercorariidae

***Stercorarius pomarinus* (Temminck)**

59	?	imm	Iernut – MS	1982.10.05	c.s., st.
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Family Laridae

***Larus minutus* Pallas**

128	♀	ad.	Iernut – MS	1983.10.05	c.s., c.p., st., v.c. 6
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***Larus ridibundus* Linnaeus**

45	♀	juv.	Iernut – MS	1982.12.07	c.s., st.
51	♂	juv.	Glodeni – MS	1985.09.13	c.s., c.p., st.
54	?	juv.	Glodeni – MS	1985.09.13	c.s., c.p., st., v.c. 5
63	♂	ad.	Târgu-Mureș – MS	1978.03.02	c.s., c.p., st., v.c. 4
79	♀	ad.	Sântioana de Mureș – MS	1982.10.22	c.s., st.
80	♀	juv.	Glodeni – MS	1985.09.13	c.s., c.p. st., v.c. 7
102	?	juv.	Iernut – MS	1983.10.05	c.s., c.p., st, v.c. 2
127	♀	ad.	Iernut – MS	1983.10.13	c.s., c.p., st., v.c. 6
131	♀	imm	Iernut – MS	1983.10.13	c.s., c.p., st., vc 6
237	♂	ad.	Iernut – MS	1996.12.08	st., c.s., c.p., v.c.5., fe.2
238	♀	ad.	Socodor – AR	2003.10.14	st., c.s., c.p., v.c.5., fe.2
244	♀?	imm	Socodor – AR	2003.10.14	st., c.s., c.p., v.c.4., fe.2,
303	♂	juv.	Iernut – MS	1979.12.07	st., c.s.
304	♀	juv.	Iernut – MS	1971.10.24	st.

***Larus canus* Linnaeus**

108	♂	juv.	Ungheni – MS	1974.04.21	c.s., st.
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302	?	imm	Gruişor – MS	1971.11.21	st.
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Larus michahellis, J.F.Naumann, 1840

17	♂	imm	6 Martie – TL	1984.11.30	c.s., c.p., st., v.c. 5
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Family Sternidae*Sterna caspia* Pallas

165	♀	ad.	Cipău – MS	1969.04.23	st.
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Sterna hirundo Linnaeus

371	♂	juv.	Moreşti – MS	1969.09.28	st.
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Chlidonias leucopterus (Temminck)

239	♂	ad.	Iernut – MS	1984.05.10	st, c.s., c.p.
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Order Columbiformes**Family Columbidae***Streptopelia decaocto* (Frivaldszky)

139	♀	ad.	Târgu-Mureş – MS	1983.05.21	c.s., st.
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Order Cuculiformes**Family Cuculidae***Cuculus canorus* Linnaeus

243	?	ad.	Ţirimia – MS	1988.05.09	st, c.s., c.p.
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Order Strigiformes**Family Tytonidae***Tyto alba* (Scopoli)

49	♀	ad.	Corneşti – MS	1991.01.13	c.s., c.p., st.
296	♂	ad.	Şimand – AR	2003.05.17	st., c.s., c.p., v.c.5, fe.2

Family Strigidae*Otus scops* (Linnaeus)

231	♀	ad.	Dumbrăvioara – MS	1968.07.18	st., c.p., fu., co.2
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Bubo bubo (Linnaeus)

26	♀	ad.	Târgu-Mureş – Zoo – MS	1968.10.09	st., co., fu.2.
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232	?	ad.	Sovata – MS	1996	scalp, st, co.2,sc., 2,c.p., fe.2
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***Athene noctua* (Scopoli)**

176	♂	ad.	Sântioana de Mureş – MS	1979.12.21	c.s., st.
177	?	juv.	Periş – MS	1975.11.09	c.s., st.
178	♀	ad.	Târgu-Mureş – MS	1969.01.13	st.
179	♂	ad.	Hărănglab – MS	1988.05.08	c.s., c.p., st.
180	♀	ad.	Ernei – MS	1968.05.08	st.
229	♂	juv.	Livezeni – MS	1999.12.02	st., c.s.
230	♂	Juv	Odorheiu Secuiesc – HR	2000	St., c.s.
294	♂	ad.	Chinari – MS	1973.10.19	st., c.s.

***Strix aluco* Linnaeus**

52	♀	ad.	Răstolița – MS	1985.02.10	c.s., c.p., st., v.c.3
101	♀	ad.	Săbed – MS	1975.02.18	c.s., st.
107	♀	ad.	Mediaş – SB	1983.12.26	c.s., c.p., st., v.d. 3
220	♂	ad.	Sângeorgiu de Mureş – MS	2001.01.21	st., c.s., c.p., v.c.4
221	♀	ad.	Târgu-Mureş – MS	2001.04.23	st., c.s., c.p., v.c.5
222	♂	juv.	Târgu-Mureş – MS	2001.05.08	st., c.s., c.p., v.c.5

***Strix uralensis* Pallas**

113	♂	ad.	Reghin – MS	1972.12	c.s., st.
60	♀	ad.	Târgu-Mureş – MS	1975.03.13	c.s., st. v.c.5
88	♀	ad.	Șilea Nirajului – MS	1976.02.16	c.s., c.p., st., v.d. 2
227	♀	ad.	Chibed – MS	1996.01.13	st., c.s., c.p., v.c.6
228	♀	ad.	Livezeni – MS	1998.12.06	st., c.s., c.p., v.c.5

***Asio otus* (Linnaeus)**

50	♂	ad.	Botorca – MS	1991.02.16	c.s., c.p., st., v.c.5
89	♂	ad.	Voivodeni – MS	1989.01.02	c.s., c.p., st., fe. 1,
90	♂	ad.	Voivodeni – MS	1989.01.02	c.s., c.p., st., fe 2,
91	♂	ad.	Sânpaul – MS	1991.01.23	c.s., c.p., st., v.c. 5
114	♀	ad.	Cristești – MS	1976.02.17	c.s., c.p., st.
181	♀	ad.	Petelea – MS	1968.12.09	st.
182	♀	ad.	Mureş county– MS	1974.06.16	c.s., st.
223	♀	ad.	Szolnok – Hu	2000.11.18	st., c.s., c.p., v.c.5
224	♀	ad.	Kiskunlacháza – Hu	1993.12.22	st., c.s., c.p., v.c.5, fe.2
225	♀	ad.	Târgu-Mureş – MS	2000.02.02	st., c.s., c.p., v.c.5
226	♂	ad.	Târgu-Mureş – MS	2007.02.22	st., c.s., c.p., v.c.6, fe.2
297	♂	ad.	Șimand – AR	2003.05.17	st., c.s., c.p., fe.2
298	♂	ad.	Iernut – MS	2005.01.04	st., c.s., c.p., v.c.4

Order Apodiformes**Family Apodidae*****Apus apus* (Linnaeus)**

256	♂	ad.	Târgu-Mureș – MS	1995.09.02	st, c.s., c.p.
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Order Coraciiformes**Family Alcedinidae*****Alcedo atthis* Linnaeus**

253	♂	ad.	Glodeni – MS	1998.12.25	st, c.s., c.p.
307	♂	ad.	Cristești – MS	1976.01.07	st., c.s., c.p., v.c.4
308	♂	juv.	Vidrasău – MS	1983.10.14	st., c.s.
309	♀?	ad.	Iernut – MS	1983.11.15	st., c.s.

Family Upupidae***Upupa epops* Linnaeus**

312	?	ad.	Petea – MS	1994.08.21	st., c.s., c.p., v.c.3
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Order Piciformes**Family Picidae*****Picus canus* Gmelin**

276	♀	ad.	Tofalău – MS	1977.02.11	st., c.s., c.p., v.c.3
279	♂	ad.	Glodeni – MS	1972.03.19	st.
280	♂	ad.	Gălești – MS	1972.01.30	st.
281	♀	ad.	Toldal – MS	1985.12.06	st., c.s., c.p., v.c.4
366	♀	ad.	Sângeorgiu de Mureș – MS	1971.03.04	st.

***Picus viridis* Linnaeus**

272	♀	ad.	Chinari – MS	1972.03.19	st.
273	♀	ad.	Săcădat (Sovata) – MS	1983.01.21	st., c.s., c.p., v.c.4
274	♂	ad.	Toldal – MS	1982.01.15	st., c.s.
277	♀	ad.	Glodeni – MS	1981.11.25	st., co.1, sc.1, fu.
364	♂	ad.	Târgu-Mureș – MS	1973.10.24	st., c.s.

***Dryocopus martius* (Linnaeus)**

35	♀	ad.	Morești – MS	1991.02.15	c.s., c.p., st., v.c. 5
270	♂	ad.	Hăghimașul Mare – HR	1968.07.02	st.
271	♀	ad.	Hăghimașul Mare – HR	1969.09.26	st.

***Dendrocopos major* (Linnaeus)**

275	♂	ad.	Găiești – MS	1968.12.05	st., co.2, fu.
283	♂	ad.	Târgu-Mureș – MS	1979.12.27	st., c.s.
365	♀	ad.	Vălenii – MS	1968.10.15	st.

***Dendrocopos medius* (Linnaeus)**

200	?	ad.	Târgu-Mureș – MS	1963.02.05	Scalp
282	♂	ad.	Morești – MS	1991.02.15	st., c.s., c.p., v.c.3

***Dendrocopos leucotos* (Bechstein)**

363	♀	ad.	Praid – HR	1969.09.28	st.
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***Dendrocopos minor* (Linnaeus)**

278	♂	ad.	Odorheiu Secuiesc – HR	1970.05.03	c.p.
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Order Passeriformes

Family Alaudidae

***Calandrella brachydactyla* (Leisler)**

335	♂	ad.	Chirileu – MS	1969.04.13	st.
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***Galerida cristata* (Linnaeus)**

344	♂	ad.	Sângeorgiu de Mureș – MS	1976.02.14	st., c.s.
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Family Motacillidae

***Anthus pratensis* (Linnaeus)**

411	?	ad.	Cristești – MS	1976.03.21	c.p.
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***Anthus spinoletta* (Linnaeus)**

260	♂	juv.	Iernut – MS	1982.10.21	st., c.s.
412	♂	ad.	Dumbrăvioara – MS	1968.03.17	st., fu., co.2

***Motacilla alba* Linnaeus**

415	♂	ad.	Toldal – MS	1985.09.13	st., c.s., c.p., v.c.4
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Family Bombycillidae

***Bombycilla garrulus* (Linnaeus)**

258	♀	ad.	Cluj-Napoca – CJ	2001.03.22	st., c.s., c.p., v.c.4, fe.2
305	♂	ad.	Târnăveni – MS	1991.02.03	st., c.s.
393	♀	ad.	Târgu-Mureș – MS	1968.03.27	st.

Family Cinclidae***Cinclus cinclus* (Linnaeus)**

315	♂	ad.	Răstolița – MS	1973.11.28	st., c.s.
316	♂	ad.	Praid – HR	1969.09.28	st.
317	♀	ad.	Târgu-Mureș – MS	1981.02.12	st., sc.1, co.1
357	♂	ad.	Târgu-Mureș – MS	1973.12.23	st., c.s.
358	?	ad.	Târgu-Mureș – MS	1973.12.23	st., c.s.
359	?	ad.	Răstolița – MS	1973.11.28	st., c.s.
360	♀	ad.	Bistra-Mureșului – MS	1974.09.12	st., sc.1, fu., co.2
361	♂	ad.	Bistra-Mureșului – MS	1974.09.27	st., c.s.
362	♂	ad.	Dumbrăvioara – MS	1972.01.23	st.

Family Turdidae***Saxicola rubetra* (Linnaeus)**

331	♀	ad.	Toldal – MS	1984.05.04	st.
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***Oenanthe oenanthe* (Linnaeus)**

254	♂	ad.	Desag – HR	1999.04.14	st, c.s., c.p.
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***Turdus torquatus* Linnaeus**

318	♀	juv.	Hăghimașul Mare – HR	1969.09.27	st.
377	♀	juv.	Hăghimașul Mare – HR	1968.07.01	st.

***Turdus pilaris* Linnaeus**

99	♀	ad.	Morești – MS	1991.02.15	c.s., c.p., st., v.c.5, v.d. 1
252	♀	ad.	Crăiești – MS	1998.11.28	st., c.s., c.p., v.c.5
319	♀	ad.	Sântioana de Mureș – MS	1978.02.11	st, c.s., c.p.
320	♀	ad.	Ercea – MS	1981.12.22	st., c.s.
374	♀	ad.	Sângeorgiu de Mureș – MS	1971.03.04	st.
375	♂	ad.	Cristești – MS	1968.03.24	st.

***Turdus philomelos* C. L. Brehm**

197	?	ad.	Târgu-Mureș – MS	1963.01.27	Scalp
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***Turdus iliacus* Linnaeus**

376	♂	ad.	Chinari – MS	1970.04.19	st.
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***Turdus viscivorus* Linnaeus**

321	♂	ad.	Voivodeni – MS	1985.01.15	st., c.s.
322	♂	ad.	Săcădat (Sovata) – MS	1983.01.21	st., c.s., c.p., v.c.5

Family Sylviidae

Locustella luscinioides (Savi)

408	♂	ad.	Iernut – MS	1970.05.02	st, c.s., c.p.
410	♀	ad.	Fărăgău – MS	1969.04.17	st.

Acrocephalus shoenobaenus (Linnaeus)

409	♂	ad.	Glodeni – MS	1968.09.10	st.
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Sylvia curruca (Linnaeus)

327	?	ad.	Toldal – MS	1984.05.04	st., sc.2, co.2
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Sylvia atricapilla (Linnaeus)

262	♀	ad.	Târgu-Mureș – MS	2005.04.09	st., c.s., c.p., v.c.5, fe.2
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Phylloscopus sibilatrix (Bechstein)

417	?	ad.	Tăureni – MS	1970.04.11	st.
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Regulus regulus (Linnaeus)

413	♂	ad.	Târgu-Mureș – MS	1976.01.28	st., c.s.
414	♀	ad.	Târgu-Mureș – MS	1976.01.28	st., c.s., fe.2

Family Paridae

Parus palustris Linnaeus

206	?	ad.	Târgu-Mureș – MS	1963.01.05	Scalp
333	♂	ad.	Găiești – MS	1968.11.23	st.
416	♂	ad.	Tofalău – MS	1977.02.11	st., c.s.

Parus cristatus Linnaeus

332	♂	ad.	Hăghimașul Mare – HR	1969.09.27	st.
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Parus major Linnaeus

334	♂	ad.	Târgu-Mureș – MS	1968.10.16	st.
404	♀	ad.	Icland – MS	1968.03.15	st., c.s.

Family Laniidae

Lanius excubitor Linnaeus

199	♂	ad.	Târgu-Mureș – MS	1963.02.05	Scalp
310	♂	ad.	Morești – MS	1969.09.28	st.
311	♂	ad.	Toldal – MS	1981.12.16	st., c.s.
352	♂	ad.	Iernut – MS	1971.10.24	st.
353	♂	ad.	Sângeorgiu de Mureș – MS	1972.03.08	st.
354	♂	ad.	Morești – MS	1970.03.15	st.

355	♂	ad.	Târgu-Mureș – MS	1976.02.14	st., c.s.
356	♂?	ad.	Ercea – MS	1980.02.20	st., c.s.
367	?	ad.	Gornești – MS	1969.02.16	st.
368	♀?	ad.	Morești – MS	1971.09.26	st.
369	♂	ad.	Iernut – MS	1972.10.29	st., c.s.
370	♂	ad.	Iernut – MS	1974.10.13	st., c.s.
326	♀	ad.	Morești – MS	1968.12.08	st.

Family Corvidae

Garrulus glandarius (Linnaeus)

47	♂	ad.	Săbed – MS	1980.04.13	c.s., st.
97	♂	ad.	Onuca – MS	1990.11.25	c.p., st., fu., sc.2, co.1, v.c.5
140	♂	ad.	Tirimia – MS	1988.04.28	c.s., st.
141	♂	ad.	Păingenii – MS	1981.02.20	c.s., st.
142	♂	ad.	Tirimia – MS	1988.04.17	c.s., st.
143	♀	ad.	Cerghid – MS	1988.03.26	c.s., st.
144	♂	ad.	Hărănglab – MS	1988.05.08	c.s., st.
145	♂	ad.	Păingenii – MS	1981.02.20	c.s., st.
146	♂	ad.	Suveica – MS	1981.02.22	c.s., st.
172	♀	ad.	Tirimia – MS	1988.04.17	c.s., st.
191	?	ad.	Târgu-Mureș – MS	1963.01.31	Scalp
192	?	ad.	Târgu-Mureș – MS	1963.01.31	Scalp
193	?	ad.	Târgu-Mureș – MS	1963.03.03	Scalp
242	♂	ad.	Cerghid – MS	1988.03.23	st., c.s., c.p., v.c.3
337	♀	ad.	Săbed – MS	1980.01.18	st., c.s.
338	♀	ad.	Glodeni – MS	1972.03.19	st.
347	♂	ad.	Borzont – HR	1969.09.28	st.
348	♂	ad.	Târgu-Mureș – MS	1970.04.04	st.
349	♂	ad.	Sângeorgiu de Mureș – MS	1972.10.29	st., c.s.
350	♂	ad.	Chinari – MS	1975.10.19	st., c.s.

Pica pica (Linnaeus)

105	♂	ad.	Sângeorgiu de Mureș – MS	1972.10.09	c.s., st.
106	♂	ad.	Săbed – MS	1975.03.14	c.s., c.p., fe., v.d.3., v.c. 6
147	♂	ad.	Toldal – MS	1981.12.02	c.s., st.
148	♂	ad.	Vidrasău – MS	1976.03.21	c.s., c.p., st., v.c. 4
149	♂	ad.	Budiu Mic – MS	1978.01.25	c.s., c.p., st., v.c. 3, fe. 2
171	♀	ad.	Cristești – MS	1969.02.02	st.
188	♀	ad.	Târgu-Mureș – MS	1963.02.05	Scalp
189	?	ad.	Târgu-Mureș – MS	1963.02.05	Scalp
336	♂	ad.	Icland – MS	1968.03.12	st., co.2., fu.
351	♀	ad.	Vălenii – MS	1968.]4.]6	st.

***Nucifraga caryocatactes* (Linnaeus)**

259	♂	ad.	Borzont – HR	1969.09.28	st.
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***Corvus monedula* Linnaeus**

98	♂	ad.	Morești – MS	1980.02.08	st., fu., sc. 1, co. 1
152	♂	ad.	Iernut – MS	1974.10.13	c.s., st.
153	?	ad.	Chinari – MS	1973.10.19	c.s., st.
173	♂	ad.	Chinari – MS	1970.04.19	st.
174	?	ad.	Săbed – MS	1969.02.19	st.
175	♂	ad.	Sânpaul – MS	1971.03.21	st.

***Corvus frugilegus* Linnaeus**

83	♀	ad.	Berghia – MS	1976.11.10	co.2., sc.1
84	♀	juv.	Cristești – MS	1976.01.07	c.s., s.t.
85	♀	juv.	Cristești – MS	1976.01.07	c.s., s.t. fu.

***Corvus cornix* Linnaeus**

46	♀	ad.	Târgu-Mureș – MS	1977.02.02	c.s., c.p., st., v.c.5
81	♀	ad.	Săbed – MS	1980.01.18	c.s., c.p., st., v.c. 4., fe., ti.
82	♀	ad.	Săbed – MS	1976.11.09	c.s., s.t.
150	♀	ad.	Morești – MS	1981.02.03	c.s., st.
151	♂	ad.	Morești – MS	1981.02.03	c.s., st.
187	?	ad.	Târgu-Mureș – MS	1963.01.06	Scalp

***Corvus corax* Linnaeus**

22	♂	ad.	Gurghiu – MS	1976.01.10	c.s., c.p., st., v.c.3
48	♀	ad.	Gurghiu – MS	1976.01.10	c.s., st.
428	?	ad.	Săbed – MS	1976.12.05	Scalp

Family Sturnidae

***Sturnus vulgaris* Linnaeus**

250	♂	juv.	Târgu-Mureș – MS	1991.10.18	st., c.s., c.p.
251	♂?	juv.	Cefa – BH	1995.09.02	st., c.s., c.p., v.c.4
313	♀?	ad.	Livezeni – MS	1968.09.17	st.
314	♂	ad.	Cristești – MS	1976.02.17	st., c.s., c.p.
378	♀	ad.	Cristești – MS	1968.03.24	st., co.2, fu.
388	♀	ad.	Săbed – MS	1976.03.01	st., co.2, sc.1, c.p.
389	♂	ad.	Cristești – MS	1974.10.20	st., sc.2, fu.
390	♂?	ad.	Chirileu – MS	1968.11.17	st.

Family Passeridae

***Passer domesticus* (Linnaeus)**

394	♂	juv.	Târgu-Mureș – MS	1975.05.25	st., c.s.
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***Passer montanus* (Linnaeus)**

395	♂?	ad.	Cristești – MS	1976.02.17	st, c.s., c.p., fe.1
396	♀	ad.	Cristești – MS	1976.10.17	st, c.s., c.p.

Family Fringillidae***Fringilla montifringilla* Linnaeus**

204	♀	ad.	Târgu-Mureș – MS	1963.01.20	Scalp
401	♂	ad.	Morești – MS	1976.01.07	st., c.s.
402	♂	ad.	Acățari – MS	1980.02.25	st., c.s.

***Serinus serinus* (Linnaeus)**

261	?	ad.	Târgu-Mureș – MS	1995.02.09	st., c.s., c.p., v.c.5, scalp
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***Carduelis chloris* (Linnaeus)**

257	♂	ad.	Târgu-Mureș – MS	2000.02.01	st., c.s.
407	♂	ad.	Morești – MS	1980.02.08	c.s.

***Carduelis carduelis* (Linnaeus)**

405	♂	ad.	Târgu-Mureș – MS	1971.11.08	st.
406	♂	ad.	Icland – MS	1968.03.15	st.

***Carduelis spinus* (Linnaeus)**

330	♂	ad.	Târgu-Mureș – MS	1969.12.16	st.
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***Carduelis cannabina* (Linnaeus)**

400	♂	ad.	Sângeorgiu de Mureș – MS	1972.10.29	st., c.s.
403	♂	ad.	Toldal – MS	1980.01.10	st., c.s.
418	♂	ad.	Fărăgău – MS	1977.02.22	st, c.s., c.p., fe.2
420	♀	ad.	Fărăgău – MS	1977.02.22	st, c.s., c.p.

***Carduelis flavirostris* (Linnaeus)**

328	♀	ad.	Târgu-Mureș – MS	1970.06.17	st.
329	♂	ad.	Târgu-Mureș – MS	1969.12.27	st.
397	♀	ad.	Târgu-Mureș – MS	1970.06.10	st., c.s.
398	♀	ad.	Târgu-Mureș – MS	1970.05.27	st., co.2, sc.1, fu., fe.2

***Carduelis flammea* (Linnaeus)**

207	♀	ad.	Târgu-Mureș – MS	1963.06.18	Scalp
399	♂	ad.	Târgu-Mureș – MS	1976.02.05	st., c.s., fe.2

***Pyrrhula pyrrhula* (Linnaeus)**

203	♂	ad.	Târgu-Mureș – MS	1964.01.11	Scalp
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***Coccothraustes coccothraustes* (Linnaeus)**

195	♀	ad.	Târgu-Mureş – MS	1964.01.11	Scalp
196	♂	ad.	Târgu-Mureş – MS	1963.01.02	Scalp
306	♂	ad.	Moreşti – MS	1991.02.15	st., c.s., c.p., v.c.3
391	♂	ad.	Târgu-Mureş – MS	1993.03.01	st, c.s., c.p.
392	♂	ad.	Praid – HR	1972.01.21	st.
419	♂	ad.	Toldal – MS	1980.01.06	st., c.s.

Family Emberizidae

***Emberiza citrinella* Linnaeus**

205	?	ad.	Târgu-Mureş – MS	1963.01.20	Scalp
323	♀	ad.	Păingenii – MS	1981.02.20	st., c.s.
324	♀?	ad.	Păingenii – MS	1981.02.20	st., c.s.
325	♀	ad.	Păingenii – MS	1982.03.23	st., c.s.
342	♂	ad.	Tofalău – MS	1977.02.11	st., c.s.
343	♀	ad.	Târgu-Mureş – MS	1979.12.28	st., c.s.
379	♂	ad.	Chinari – MS	1974.02.11	st.
380	♂	ad.	Chinari – MS	1974.02.11	st., c.s.
381	♀	ad.	Chinari – MS	1974.02.11	st., c.s.
382	♀?	ad.	Gorneşti – MS	1968.03.14	st., co.1,
383	♂	ad.	Sângeorgiu de Mureş – MS	1972.10.29	st., co.2, sc.1

***Emberiza schoeniclus* (Linnaeus)**

385	♂	ad.	Iernut – MS	1970.04.02	st.
386	♀	ad.	Târgu-Mureş – MS	1976.02.05	st., c.s.
387	♂	ad.	Fărăgău – MS	1982.02.09	st., c.s.

***Miliaria calandra* (Linnaeus)**

341	♂	ad.	Fărăgău – MS	1977.02.22	st., c.s., c.p., v.c.4, fe.2
384	?	ad.	Gorneşti – MS	1968.10.13	st.

ABBREVIATIONS

st. – sternum
c.p. – pelvic belt (ilion, ischion, pubis)
c.s. – scapular belt (sc., fu., co.)
co. – coracoid
scalp
fe. – femur
fu. – furcula (clavicle)
hu. – humerus

ra. – radius
ra.-cu. – radius – cubitus
sc. – scapula
t-m. – tarsus-metatarsus
ti.-ta. – tibia-tarsus
ul. – ulna
v.c. – vertebrae caudales
v.d. – vertebrae dorsales

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I would like to thank once again to hunters, collectors, collaborators, colleagues from different guild who contributed voluntarily, without compensation, to enrich the public collections. I would like to thank also to my understanding and patient colleagues that had „suffered” for years, with stoicism and courage worthy of devoted professionals in the “atmosphere” of my poorly endowed laboratory, extrapolated in neighboring rooms. Enjoy your reading.

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CATALOGUL SISTEMATIC AL COLECŢIEI DE SCHELETE PARŢIALE DE PĂSĂRI A MUZEULUI JUDEŢEAN MUREŞ, SECŢIA DE ŞTIINŢELE NATURII TÂRGU-MUREŞ

(rezumat)

Lucrarea de faţă prezintă colecţia de schelete parţiale de păsări a Muzeului de Ştiinţele Naturii din Târgu Mureş. Datele cele mai importante sunt ordonate într-un catalog sistematic. Colecţia este alcătuită din 428 de piese, aparţinând la 135 de specii de păsări. Ele au fost adunate de către 100 de colecţionari (inclusiv personalul muzeului) din 10 judeţe şi 101 localităţi din ţară (doar 2 exemplare provin din Ungaria). O singură donaţie, care conţine 23 de piese preparate, provine de la domnul Szabó József. Celelalte 395 de schelete parţiale au fost preparate de către subsemnatul, iar 10 piese de către specialiştii muzeului.

Această colecţie a fost realizată cu scopul de a fi folosită la determinarea prin comparaţie a rămăşişelor de hrană a păsărilor răpitoare, la determinarea cadavrelor păsărilor moarte prin electrocutare, la recunoaşterea pieselor braconate în scopuri ilicite, precum şi pentru a fi folosită la studii anatomice comparative ale clasei Aves.

PALEONTOLOGY AND MINERALOGY

THE GIANT DEER *MEGALOCEROS GIGANTEUS* (CERVIDAE, MAMMALIA) AT SELEUŞ (MUREŞ DISTRICT)

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Abstract: The giant deer (*Megaloceros giganteus*) is a rather common fossil vertebrate found in the Pleistocene deposits in Romania. However, it is by far rarer compared to other coeval large herbivores like mammoth, woolly rhinoceros or steppe bison. The paper refers to half of a mandible of giant deer, recently discovered in Transylvania in the alluvia of the Târnava Mare lower terrace, at Seleuş. As this fossil was found isolate without any associated taxa, it is difficult to assign a clear geological age of the bearing deposit but considering the extinction of this species in whole Europe, one can relate this fossil firstly to late Pleistocene. Seleuş is a new giant deer locality in our country.

Keywords: Romania, Transylvania, Pleistocene, giant deer, river terrace.

Introduction

In similar way as in various other Quaternary localities from Romania, the river terrace deposits from Transylvania are often bearing Pleistocene mamal remains, mainly large herbivores. In southern Transylvania, alongside Târnava Mare River there are exposed Pleistocene and Holocene terrace deposits. Some of them yielded Pleistocene vertebrates like the ones at Brătei, upstream to Mediaş town, unearthed in the 12 m terrace, where steppe bison (*Bison priscus* [Bojanus]), woolly rhinoceros (*Coelodonta antiquitatis* [Blumenbach]), horse (*Equus caballus germanicus* Nehring, 1884) or elk (*Alces alces* Linnaeus, 1758) remains were collected several decades ago (Samson and Hermann, 1968).

Recently Marian Hara, an enthusiastic amateur collector of fossils, recovered from similar deposits exposed at Seleuş (Mureş District; Fig. 1), a fragment of mandible of the giant deer *Megaloceros giganteus* (Blumenbach, 1799). The fossil is curate in his own personal collection. This finding gave us the opportunity to reiterate a discussion about this large herbivore in Transylvania.

Systematic paleontology

Family Cervidae Goldfuss, 1820

Subfamily Cervinae Goldfuss, 1820

Genus *Megaloceros* Brookes, 1828

Megaloceros giganteus (Blumenbach, 1803)

Plate I: Figs. 1–3

A single left mandible horizontal branch with cheek teeth, belonging to a mature individual is available for study. Before burial, the bone was carried on rather long distance, being rolled and broken: the ascending branch, the angular process and the symphysis are all missing. Under the premolar series, the bone is longitudinally severely broken too.

The whole series of cheek teeth is adequately preserved, exposing moderate to advanced tooth wear. The single premolar more damaged is p2, with the mesial half of crown broken. The labial enamel tooth wall is missing in p2, p3 (the anterior lobe, on outer mesial side only) and m1 (a small portion of anterior lobe in same area). All molars are devoid of the *Palaeomeryx* fold. The ectostylids are well expressed in all molars. In m3, apart the anterior ectostylid situated between the protoconid and hypoconide, a vestigial remain could document the existence of a second ectostylid, located post-hypoconide. Only weak cingulum can be observed on lateral sides of the cheek teeth, mainly on lingual ones of the molars.

The Seleuş specimen has medium-sized teeth, according the comparative measurements reported by Croitor (2008) for different *Megaloceros* localities from Europe (Fig. 2). Even estimated – due to damages occurred to p2 –, one may appreciate that the tooth row length has intermediary position among the giant deer sample from Dublin, but seems to be somewhat longer than Duruitoarea Veche (Republic of Moldova). The same concerns p2 *vs.* m1 length, but the estimated premolar series length is close to Duruitoarea Veche. Croitor considered this character as a primitive condition. However, in Croitor's mentioned sample, this difference concerns mainly the upper teeth, being less expressed in the lower ones. Therefore, as we are dealing with just a single specimen, it would too speculative to consider it as one bearing primitive characters. Another peculiar feature in our fossil is the value of the mandible thickness (Fig. 3). Shearing Lister's (1994) opinion, Croitor (2008) related this character to the well expressed sexual dimorphism, weak mandible pachyostosis belonging to females, while males would have more robust mandibles. Following this reasoning, one can relate the Seleuş specimen to a male.

Measurements (mm) of the left giant deer mandible from Seleuşul Mare. Length p2-m3: 165.0 (estimated); length p2-p4: 61.0 (estimated); length m1-m3: 104.0; mandibular thickness at m3: 39.0; premolar/molar ratio: 0.59; p3: length – 23.5; breadth – 15.7; p4: length – 24.0; breadth – 17.5; m1: length – 27.5; breadth – 20.4; m2: length – 33.4; breadth – 22.0; m3: length – 43.0; breadth – 22.0.

Discussions

Aaris-Sørensen and Liljegren (2004) and Stuart et al. (2004) showed that in Europe the giant deer became extinct before the Pleistocene/Holocene boundary, but recorded a longer survival in Holocene, in Asia. In Romania there is a similar tendency, the oldest reports of the giant deer in Romania being in Riss/Saale as in Bodoc-3 in southeastern Transylvania (Rădulescu and Samson, 1985), followed by more frequent finds in the next glacial (Würm/Weichsel) (e.g. Koch, 1876, 1891, 1900; Szentpétery, 1911; Jurcsák, 1974; Rădulescu and Samson, 1985). However, an overview on the giant deer in Transylvania and in whole Romania is still missing. The 19th century findings are usually fortuitous, completely devoid or extremely poor in taphonomic details and based on poor stratigraphy. The subsequent ones are in the majority of cases in same situation excepting rare cases, as the ones from Bârsei Basin in southeastern Transylvania.

In Seleuş, there is a different taphonomy if compared either to the localities from the Republic of Moldova (archaeological Upper Paleolithic sites; Croitor, 2008), or to Ireland (swampy environment, with fair preservation of numerous complete or nearly complete skeletons; Listner, 1994). As we already mentioned, the new locality yielded for instance just a fragmentary bone, carried by the water streams before its definitive burial in the terrace alluvia. In such circumstances, we have very meager arguments available to coin a sharp stratigraphy: there is not any additional taxon alongside the giant deer, and radiometric dating is missing too. However, considering the time range and the extinction of this species in the whole Europe (Listner, 1994; Stuart et al., 2004), tacking also into consideration the stratigraphy of the other finds in Romania, one can appreciate that the Seleuş specimen rather belonged to an Upper Pleistocene representative.

Acknowledgements. Authors thank Marian Hara for allowing the access to the giant deer specimen collected by himself at Seleuş.

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CERBUL GIGANT *MEGALOCEROS GIGANTEUS* (CERVIDAE, MAMMALIA) DE LA SELEUŞ (JUDEŢUL MUREŞ)

(rezumat)

Cerbul gigat (*Megaloceros giganteus*) este un ierbivor mare fosil, relativ comun în depozitele pleistocene din România. Totuşi, este considerabil mai rar decât alte ierbivore contemporane precum mamutul, rinocerul lânos sau bizonul de stepă. O hemimandibulă de cerb gigat a fost recent descoperită în Transilvania, în aluviunile terasei inferioare ale Târnavei Mari, la Seleuş. Cum descoperirea de la Seleuş se referă la un fragment scheletic izolat, aşadar fără alţi taxoni asociaţi, este dificil de a preciza cu exactitate vârsta geologică a depozitului din care provine fosila, însă dacă luăm în considerare extincţia acestui mamifer în întreaga Europă, putem presupune mai degrabă că terasa în discuţie revine Pleistocenului terminal. Seleuş este o nouă localitate cu cerb gigat în România.

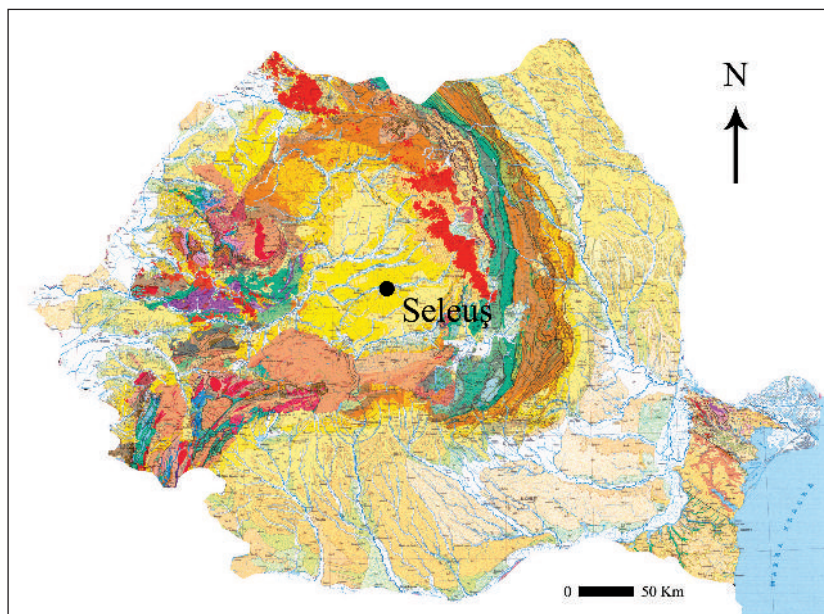


Fig. 1: Location of Seleus locality on the geological map of Romania.

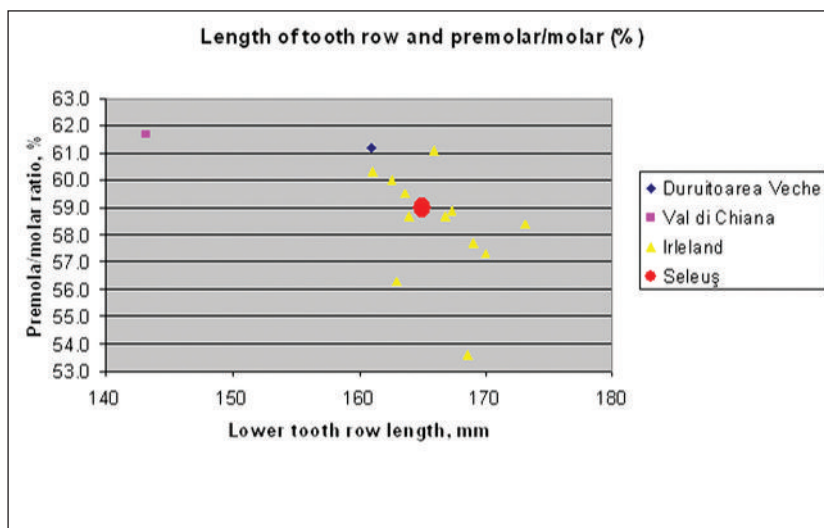


Fig. 2: Length of lower tooth row *vs.* premolar/molar ratio (%) in giant deer originating from various localities (data from Croitor, 2008, added up)

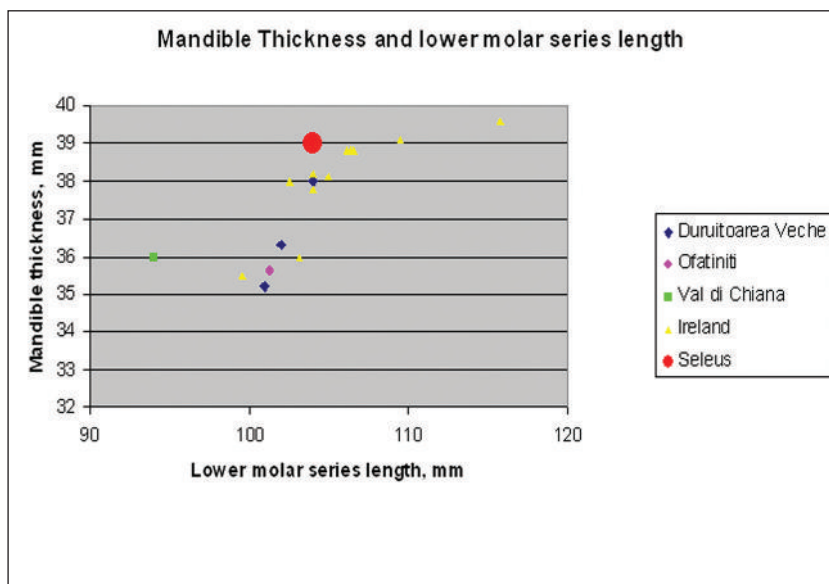


Fig. 3: Mandible thickness *vs.* lower molar series length in giant deer from various localities (data from Croitor, 2008, added up)



Pl. I : *Megaloceros giganteus* from Seleuş (Mureş District); left half-mandible with p2–m3, ♂;
Fig. 1 – occlusal view; Fig. 2 – labial view; Fig. 3 – lingual view. Scale bar: 10 cm.

COLLECTIONS AND COLLECTORS: THE SAMUEL VON BRUKENTHAL MINERAL COLLECTION

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Abstract: Samuel von Brukenthal's activity as collector of paintings, coins, medals and furniture items is well known. Nevertheless, the baron's interest in collecting valuable mineral samples and fossils is less known. It is this particular passion that we intend to dwell upon in the following material.

One cannot estimate precisely when Brukenthal started his collection. From Fichtel's note of 1780, in a paper on the geological research from Transylvania, we work out that he did not have his own collection in 1778. In order to put together and look after these cultural treasures, he had by his side knowledgeable literates in this field such as Johann Fichtel, Johann Michael von Rosenfeld, Carl Eder etc. Currently, Baron Brukenthal's mineral collection is hosted at the Natural History Museum from Sibiu and includes 3,622 samples. This is actual the baron's original collection, to which the mineral collection of the Rosenfeld council thesaurus was added. The Rosenfeld collection catalogue and the systematical arrangement of the collection were done by Neugeboren. The collection is maintained in the same display that Neugeboren set up, namely it is divided into six groups (according to the system of the renowned mineralogist and crystallographer Weiss): Oxide rocks (718 pieces), Salic rocks (775 pieces), Oxide ores (304 pieces), Sulphurous metals (1129 items), Native metals (526 items), Inflammable (3 pieces).

With regards to the geographic spread, the samples are mostly from the Romanian territory, coming from the "golden quadrangle" of the Western Mountains (Munții Apuseni) – Săcărâmb, Baia de Arieș, Măgura-Toplița, Băița Crăciunești, Fața Băii, Techereu, Roșia Montană etc.), the Trascău Mountains, the Poiana Ruscă Mountains, the Baia Mare metal-genetical area, the Moldova Nouă-Oravița-Dognecea area (Banat), the Rodna deposit etc. The samples purchased abroad are not in high numbers and belong to emerging areas from Hungary, Czech Republic, Slovakia, Serbia, Austria, Switzerland, Italy, Norway and Russia. The baron's mineral collection, which was further improved after the death of its founder, has nowadays a great scientific and historic importance, and an equally significant role for the museum perspective. It is the concrete proof of the preoccupations, knowledge about nature and the generosity of this forerunner of the systematic study of the environment, as starting point for its protection.

Keywords: mineral, collection, Brukenthal, Sibiu.

Introduction

Samuel von Brukenthal's activity as collector of paintings, coins, medals and furniture items is well known. Nevertheless, the baron's interest in collecting valuable mineral samples and fossils is less known. It is this particular passion that we intend to dwell upon in the following material.

After 1690 Transylvania was the domination of The Habsburg Empire and thus constituted a fertile ground for the principles of Enlightenment, which fostered and stimulated research

in natural sciences, too. The research of minerals was also influenced favorably by economic interests aiming to exploit the mineral resources of Transylvania. Thus, in the eighteenth century, new directions for studying and setting up mineralogical collections were outlined. Eighteenth-century Transylvanian naturalist literature consists mainly of monographic works about the minerals of the Principality.

After having studied in Halle, Jena and Vienna, the Brukenthal baron returned to Sibiu and held various positions in the administration of Transylvania, the most important one having been that of governor (1774–1787). As imperial official, Brukenthal also managed the financial affairs of the state, and took into account the priceless source of income which the mineral resources represented for the Viennese Court and the private entrepreneurs alike.

He had such preoccupations even before his governor role. In January 1767, as President of the Chancery Court, he mentions in a report on the economic situation of the Grand Principality of Transylvania, the noble/precious metals which could be extracted from the mines of Transylvania, and could thus constitute new sources of income. In 1764, in order to further stimulate the mining activity, Brukenthal brings forward the idea of creating a University in Transylvania. Although he does not consider a natural science department as such, he does suggest establishing a department of “economy and state revenues”, which would address also the mines, rich sources of revenue for the imperial treasury (Göllner, 1977, p. 15).

As President of the Chancery Court, he issues a report about the economic situation of the Grand Principality of Transylvania, where he refers to the increase in the price of salt and to the amount of noble metals that could be extracted from the mines of Transylvania. (Göllner, 1977, p. 15)

After his return from Vienna, Brukenthal has now shares in the mines from Săcărâmb, Zlatna, Toplița, Boița and Bucium. The areas where most of the minerals were collected from are today located in the golden quadrangle of Transylvania. The documents in his archive reveal that the acquisition of the shares was not so much about profit, but rather about encouraging the leverage of Transylvanian wealth. Thus in 1775, Brukenthal had 8 shares at the gallery of Barbara Zlatna and in 1781 – 8 shares at the St. Clement gallery of Săcărâmb. In 1782 he bought 8 shares at Toplița Bucium, Boița (Schuller, 1969, p.285). As governor and shareholder in mining, Brukenthal had access to valuable mineral samples. (Ittu, 2008)

His mineral collection reflects both of the main directions of his existence, the systematic – scientific and the practical, economic one. At the Sibiu State Archives, namely in the Brukenthal fond, one can find some of Baron Brukenthal’s shares at the main mines from Transylvania. His acquisition of shares was not only due to economic reasons but also meant to stimulate the mineral resources exploitation, especially in order to improve geological research in Transylvania.

There was also another side to this interest – setting up the collection, mentioned by his biographer, Georg Adolf Schuller. Between 1770 and 1780, in Sweden, Linnaeus revolutionized the systematic organization of the vegetal world fostered scientific research in natural sciences. Linnaeus’s research influenced his countrymen Kronstedt, Bergmann and Wallerius. They applied Linnaeus’s new ideas in the research of minerals. Their works arrived to Vienna and from here to Transylvania. On the other hand, the growing interest in mineral resources has led to the emergence of a new fashion: setting up mineral collections. At the Viennese Court, Emperor Francis I was a zealous collector. He was the founder of the “cabinets”, within which various collections were built. At the Court there was also a “cabinet of natural sciences”, which was also present in the noble houses throughout Austro-Hungary and the entire Western Europe. It seems that these Viennese collections set a strong example and thus influenced Brukenthal’s activity as collector. (Schuller, 1969, p.283, 284). At the Halle University, the true school of the future enlighten scholars, Brukenthal came to understand the importance of the personal

example, of the political pragmatism, of philosophical openness and of the habit to set up an artistic and literary environment.

In his work of 1778 – “Beitrag zur Mineralgeschichte von Siebenbürgen” (“Contribution to the history of minerals in Transylvania”), Fichtel, a thesaurus clerk, would regretfully point out the absence of minerals from his collections in Transylvania. Therefore at that time, Brukenthal did not have a mineral collection yet. In the same paper, Fichtel expresses his appreciation of Brukenthal’s library and noticed “this learned country leader is now considering a natural collection within his library ... what an inspiring example”. Fichtel’s paper, the research undergone by Reichenstein – who discovered tellurium – all fostered Brukenthal’s activity as minerals’ collector and collector of mineralogical literature.

In 1790 the library included 13,000 books in various fields of history, philosophy, theology and mineralogy. These volumes had been brought from cities like Jena, Halle and other cultural centers of France, Switzerland, etc. during the times when Brukenthal was student. The richness and diversity of library books, special scientific value, showed that the action occurred happened after the acquisition of scientific methods. Around Brukenthal was constituted a circle of Enlightenments. One of them Johann Flitsch developed a scientific society with a science department. All of the group’s Brukenthal appeared first scientific journals and publishers in Romania today, “Siebenbürgische Quartalschrift” published in 1790 and articles had appeared in the natural sciences (Göllner, 1977, p.61; Gündisch, 1987, p. 405).

His struggle to improve the exploitation of the land richness for the benefit of the state budget and the encouragement the Viennese collections would provide, gave a scientific direction to his preoccupation for minerals. The complexity of the mineralogical books collection from the library revealed that Samuel von Brukenthal appreciated not only the arts and literature, but he also had an extensive knowledge and concern for the natural sciences, especially for minerals. The honorary member title he was granted in 1798 by the “Mineralogical Society of Jena” (Jenaische mineralogische Sozietät) comes as recognition of his endeavors for mineralogical sciences and of his role protector. In the letter which accompanied the diploma, the Association Director, refers to him as a “connoisseur and protector of the mineralogical sciences”. (Göllner, 1977, p. 15)

After his dismissal from his position as governor, Brukenthal had more time for his collections and scientific interests within the Enlightenment’s circle that came to life in Sibiu around him.

One cannot estimate precisely when Brukenthal started his collection. From Fichtel’s note of 1780, in a paper on the geological research from Transylvania, we work out that he did not have his own collection in 1778. Schuller (1969, p.12) quotes Fichtel, who mentioned Brukenthal’s “praiseworthy” intention to create a mineral collection. “This learned leader of the country is now considering a natural collection related to the library. What an excellent prospect for the future and for the great geniuses, who miss only the opportunity and the inspiring examples.” (Schuller 1969, p. 12) Therefore we could assume that Brukenthal started to set up his collection in 1780. It was between 1770 and 1780 that the trend of scientific research in natural history, which had started in Sweden, would now take over



Br. Brukenthal.

Fig. 1: Governor Samuel von Brukenthal (1721–1803)

rest of Europe. He continues to improve his collection until the last years of his life. One may conclude that after the mid 90's the collection was completed and a new stage in the evolution of the Brukenthal mineral collection was about to begin: the classification. It could be estimated that around 1795 years collections of minerals were formed. To sum up, he set up the most significant part of his collection between 1778 and 1787. The few acquisitions were done shortly before his death, namely between 1799 and 1800, when he bought golden samples. Nevertheless, we can estimate that around 1795 his mineral collection was established.

In order to put together and look after these cultural treasures, he had by his side knowledgeable literates in this field such as Johann Fichtel, Johann Michael von Rosenfeld, Carl Eder etc. Abbot Carl Eder (1760–1810), the Director of the Normale School from Sibiu, supported Brukenthal "with his advice and deeds". As curator of the collection, not only does he rank it by the most advanced scientific criteria of the time, but also puts together the first catalogue. The manuscript – catalogue, "Verzeichnis Siebenbürgischer Mineralien, die sich in dem von Brukenthal Cabinette often Freiherrn befinden," has 353 pages and can be currently found at the Brukenthal Library. In the catalogue, Carl Eder points out that up to that moment "that much pure gold" could not be found in any other European country, and that Baron Samuel von Brukenthal's collection reflected this reality. The catalogue has mostly historical value and poises interest for the notes related to the location and the date when the items were gathered, as well as to the status of their examination and to the exploitation attempts registered. (Tausch, 1868, p.270; Schuller, 1969, p.286)

The next curator of the collection, equally successful, was Neugeboren Johann Ludwig (1806–1887), one of the most prominent forerunners of paleontology in Transylvania. His work *Notizen über Sammlungen Siebenbürgischer Mineralien*, published in 1866, proved that Neugeboren was aware of most of the Transylvanian mineral collectors and of their collections from the eighteenth and nineteenth centuries. This awareness enabled him to compare the Brukenthal collection to other collections of that time as well as to those that would follow it. Neugeboren believes that only one collection rises to its level, in what concerns samples of gold, copper, silver and nagyagite, namely that of Karl Knöpfer. (Neugeboren, 1866, p. 391)

Baron Samuel von Brukenthal's mineral collection reached 2018 items, most of which of Transylvanian origin, souring the time when Carl Eder was custodian. Collection grew richer over the years, but the most valuable collection acquisition was the collection belonging to the Thesaurus Counselor Johann Michael von Rosenfeld (1771–1837). When referring to the Rosenfeld Collection in his work published in 1866, L.J.Neugeboren, pointed out that the Baron's buying this particular collection represented a great opportunity for the study of the Transylvanian minerals, since thus all the Transylvanian ores would be represented.

As custodian, Neugeboren Baron arranged the Baron's collection and put together the second catalogue of the collection. The three – volume manuscript – catalogue is currently hosted at the Brukenthal Library and is *Brukenthalisches Hausarchiv, Verzeichnis der Mineraliensammlung*.

Most of the collectors of the time, although excited at the beginning to collect native minerals, would give in to the scientific urge to enrich their collections with items from abroad – as Fichtel would notice in 1774, with regards to the mineralogical collections of Transylvania. Baron Samuel von Brukenthal's collection is therefore unique, since it includes only 50 pieces from outside of Transylvania (from Austria, Hungary, Bohemia, Sweden).

The location and the classification of the collection went through several changes throughout time. As per baron Samuel von Brukenthal's will, after the last offspring of the family had passed away – Hermann von Brukenthal – in 1872, the collections were automatically taken over by the Evangelic Church (Ittu, 2007). The mineral collection, though originally

indistinct from the other collections, was offered in 1923 by the management of the Brukenthal Museum during those times, to the “Transylvanian Association for Natural Sciences”, but without conceding its ownership (Binder, 1958). The Collection was then relocated to the Natural History Museum.

Later on, as per Decree 176 of August 3rd 1948 on the state taking over the estates of the churches, the congregations, the communities or the private owners, the Brukenthal Museum heritage went under the administration of the Ministry of Arts and Information (Ittu, 2008). Thus the baron’s mineral collection, too, reached once again its “mother” institution in writing, but it actually remained in the museum deposits. Presently, the collection is under retrocession (Decision no. 21 of November 21, 2005), alongside the entire heritage of the Brukenthal Museum to the Evangelic Church, the rightful owner of the Brukenthal foundation heritage, which has been further enriched by three barons throughout history.

Results and discussions

Currently, Baron Brukenthal’s mineral collection is hosted at the Natural History Museum from Sibiu and includes 3,622 samples. This is actual the baron’s original collection, to which the mineral collection of the Rosenfeld council thesaurus was added. The Rosenfeld collection catalogue and the systematical arrangement of the collection were done by Neugeboren.

The collection is maintained in the same display that Neugeboren set up, namely it is divided into six groups (according to the system of the renowned mineralogist and crystallographer Weiss):

- | | |
|------------------------------|-----------------------------------|
| I. Oxide rocks (718 pieces) | IV Sulphurous metals (1129 items) |
| II. Salic rocks (775 pieces) | V. Native metals (526 items) |
| III. Oxide ores (304 pieces) | VI. Inflammable (3 pieces) |

When studying the collection, one ought not to lose sight of the realities of that time: the number of mineral species in that period was ten times smaller than today, the research methods were hardly outlined and mineral collections were not primarily scientific.

A first reading of the inventory and a brief review of the collection would reveal that it was especially the aesthetic criteria that guided the collector, therefore the first two groups represent almost half of the total of collection items. Although it was the aesthetic that was primary in selecting the items, it was the economic reasoning that empowered the process.

1. *The “oxide rocks” class*: it is represented numerically and aesthetically by the quartz (428 quartz samples). The stones are unique especially due to the size of the crystals (between 3 and 10 cm), the variety of colors – from the Săcărâmb, Cavnic, Baia de Arieș ones, perfectly transparent, to the pale violet amethyst from Roșia Montană, and to the dark violet one at Porcura (the Barbara mine).



Fig. 2. Săcărâmb–Quartz (HD) (Inv. no. 2407)

2. The “salinic rocks” class is represented by: carbonates (calcit, aragonit, dolomit), sulphates (plaster stone, barit), phosphates (apatite), fluorides (fluorite), chlorides (halit) as well as by rocks, such as: limestone, limy tuffs, oolites, pisolites și diorite sand.

The *carbonates* Class: is well represented numerically, 296 samples, but not from the species variety point of view. The calcium within the salic stones group is dominant due to the variant of the crystallographic forms (dull rhombohedra, scalenoedri, etc.) as well as due to the color diversity (milky white, beige, pink, etc.) Most of the samples are from Fața Băii, Boița, Săcărâmb, Căvnic, Rodna and so on.

The *sulphates*, also included in the “Salice rocks” group, are represented mostly by barytes (140 pieces) and gypsum (78 pieces). The samples from Roșia Montană, Boița, Baia de Arieș, Căvnic, Rodna stand out due to the size of the tabular – angled macle crystals and to the variety of the colors – from transparent to bluish-white.



Fig. 3: Gypsum – Baia de Arieș (AB), inv. no. 3678

3. The “salinic metals” class includes: carbonates (siderite, azurite, malachite, cerussite), sulphates (alunite), phosphates (pyromorphite), arseniate (eritrin), molybdates (wulfenite) and oxides (hematite).

The azurite and the malachite, though present in smaller numbers (96 pieces), are impressive due to their coloring and due to the size of the elongate prismatic crystals (samples from Băița, Ghelar, Moldova Nouă).

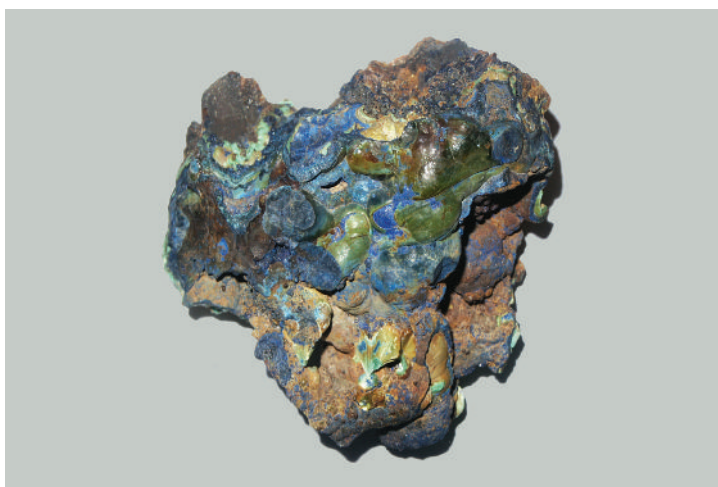


Fig. 4: Azurite – Dognecă (CS), inv. no. 3916

4. The “oxide ores” class includes oxides (magnetite, hematite, limonite, ilmenite, cassiterite, piroluzit, rutile, wade, cuprite, tenorite) and carbonates (rhodochrosite). The rhodochrosite

samples from Săcărâmb, Baia de Arieș, Cavnic etc. stand out especially due to the diversity of the macles and to the coloring of the crystals.

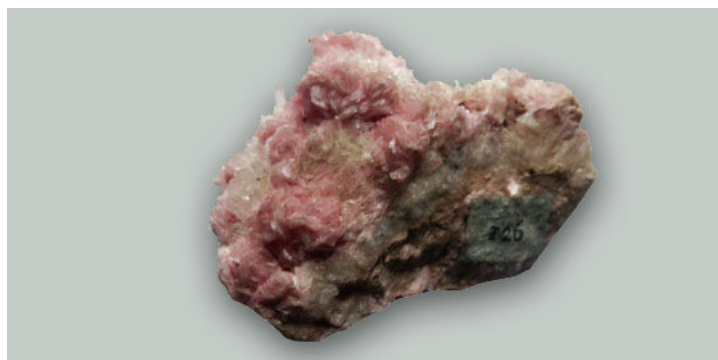


Fig. 5: Rhodochrosite – Dognecea (CS), inv. no. 4327

5. The “*native metals*” class, such as gold, have contributed to the reputation of the collection. In this class, according to the classification made by the second custodian of the collection and as mentioned above, one needs to include minerals such as: silver, telluride, bismuth, copper and arsen.

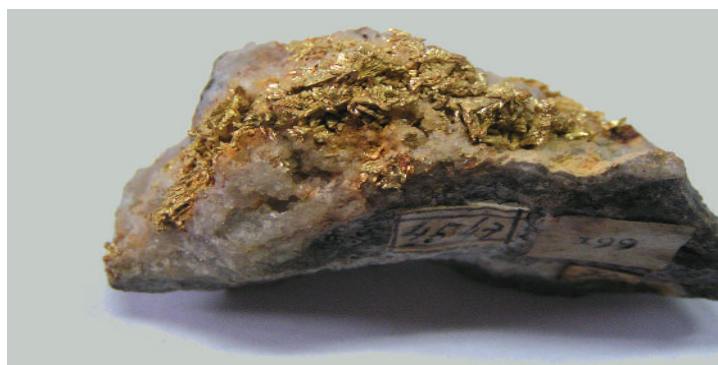


Fig. 6: Gold – Dognecea (CS), inv. no. 4067

While travelling in Transylvania and visiting Sibiu, the Danish researcher Jens Esmark, pointed out, among the mineral collections he had come across, baron Samuel von Brukenthal's in particular, and especially “the pure gold suite”, which he considered to be the most complete suite of golden samples he had ever seen. Among these, two very interesting samples stood out: one with cubical golden crystals and another one with crystals laid in two double pyramids with eight sides. Carl Eder's catalogue, Jens Esmark's travel reports and those of other foreign travelers made the gold, silver and gold and silver telluride samples well known in the entire Europe. There are 438 pieces of gold and 271 gold-silver tellurides (petzite, sylvanite, krennerite and nagyagite). The samples were collected from the gold deposits from Săcărâmb, Baia de Arieș, Zlatna and especially from the mines where the baron had shares (the Barbara and St. Clement mines) (Esmark, 1798; Schuller, 1969, p. 287)

6. The “*sulfide metals*” class includes minerals such as: iron pyrites, arsenopyrite, cobaltite, smaltite, chalcopyrite, bornite, galenite, argentite, hessite, cuprite, calcozine, bournonite, sylvanite, krennerite, nagyagite, telluride, molybdenite, antimony, tetrahedrite, bournonite, stephanite, sphalerite, alabandite, cinnabarite, realgar, auripigment.

Form the *Sulfurs* – the “metal sulphides” group – the antimony sample dominants aesthetically (92 pieces) from Cavnic, Sacaramb, Baia de Arieș, Toplița, with 8–10 cm long crystals.



Fig. 7: Silvanit – Dognecea (CS), inv. no. 5339

7. The “*inflammable*” class includes sulf, lignite and ozokerite.

It comes without saying that the numeric reports mentioned above between the minerals more or less often represented in the collection, were determined – beside their more or less impressive aspect – also by their more or less common presence in the nature of the various species, as well as by how easily one would come in their possession. It is likely that upon setting up his minerals cabinet, Brukenthal the collector might have been guided mainly by aesthetic criteria and possibly by their value or mineralogical particularities.

With regards to the geographic spread, the samples are mostly from the Romanian territory, coming from the “golden quadrangle” of the Western Mountains (Munții Apuseni) – Săcărâmb, Baia de Arieș, Măgura-Toplița, Băița Crăciunești, Fața Băii, Techereu, Roșia Montană etc.), the Trascău Mountains, the Poiana Ruscă Mountains, the Baia Mare metal-genetiacal area, the Moldova Nouă-Oravița-Dognecea area (Banat), the Rodna deposit etc. The samples purchased abroad are not in high numbers and belong to emerging areas from Hungary, Czech Republic, Slovakia, Serbia, Austria, Switzerland, Italy, Norway and Russia.

Baron Samuel von Brukenthal’ collections were accessible to all visitors and were visited by the foreigners passed by Sibiu at the end of the eighteenth-century (Armbruster, 1978, p.36). We cannot leave out the fact that the collector’s passion reflects the trend of the age, which however came to represent a purpose in itself for Brukenthal. (Armbruster, 1978, p. 36)

Conclusions

The baron’s mineral collection, which was further improved after the death of its founder, has nowadays a great scientific and historic importance, and an equally significant role for the museum perspective. It is the concrete proof of the preoccupations, knowledge about nature and the generosity of this forerunner of the systematic study of the environment, as starting point for its protection. If Sibiu “becomes at the end of the eighteenth century the center of the naturalist movement in Transylvania” (E. Pop), thus gaining an international reputation as scientific and cultural center, that was primarily thanks to this Mecena of sciences and arts that Samuel von Brukenthal embodied.

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COLECȚII ȘI COLECȚIONARI: COLECȚIA DE MINERALE SAMUEL VON BRUKENTHAL

(rezumat)

Activitatea de colecționar de tablouri, monede, medalii, mobilier a lui Samuel von Brukenthal este bine cunoscută. În schimb, mai puțin cunoscut este interesul baronului pentru adunarea unor mostre valoroase de minerale și fosile. Asupra acestei pasiuni ne propunem să ne oprim în cele ce urmează.

Baronul Brukenthal, după ce a studiat la Halle, Jena și Viena, revenit la Sibiu, a ocupat diverse funcții în administrația Transilvaniei, culminând cu cea de guvernator (1774–1787). Ca funcționar imperial, el s-a ocupat și de problemele finanțelor statului. Brukenthal a avut în vedere și inestimabila sursă de venituri pe care o constituiau bogățiile subsolice pentru Curtea Veneză și pentru particulari.

Strădania sa de a valorifica mai bine bogățiile pământului țării pentru bugetul statului și impulsurile pe care el le primea de la colecțiile vieneze au dat preocupărilor sale pentru minerale o direcție științifică. Complexitatea colecției, cărțile de mineralogie din bibliotecă, relevă că Samuel von Brukenthal aprecia nu numai artele și literatura, ci avea cunoștințe și preocupări ample și pentru științele naturii, îndeosebi pentru mineralogie. O recunoaștere a preocupărilor pentru domeniul științelor mineralogice și rolului său de protector al acestora, a fost titlul de membru onorific pe care i l-a acordat la 1 iulie 1798, „Societatea de mineralogie de la Jena” (*Jenaische mineralogische Sozietät*).

Nu se poate aprecia când și-a început Brukenthal colecția. Sursele bibliografice evidențiază că după 1778 a început constituirea colecției. Pentru a-și valorifica și întreține aceste comori culturale a avut alături cunosători în domeniu, ei înșiși colecționari de renume în epocă, precum: Johann Fichtel, Johann Michael von Rosenfeld, Carl Eder ș.a.

Carl Eder, primul custode al colecției, nu numai că o ordonează după cele mai avansate criterii științifice din epocă, dar realizează și primul catalog. Catalogul-maniscrip, „Verzeichnis Siebenbürgischer Mineralien, die sich in dem Cabinette des Freiherrn von Brukenthal befinden”, are 353 de pagini și se află în prezent la Biblioteca Brukenthal. Cel care urmează pe post de custode al colecției, cu același succes, este Ludwig Johann Neugeboren (1806–1887), unul dintre cei mai de seamă înaintași ai paleontologiei transilvane. Lucrarea sa, *Notizen über Sammlungen siebenbürgischer Mineralien*, apărută în 1866, dovedește că Neugeboren a cunoscut pe cei mai mulți dintre colecționarii transilvăneni de minerale și colecțiile lor din veacurile XVIII și XIX. Această cunoaștere i-a oferit posibilitatea comparării colecției Brukenthal cu acelea contemporane și ulterioare ei. Neugeboren consideră că o singură colecție se ridică la nivelul ei, în ceea ce privește eșantioanele de aur, cupru, argint și nagyagit, cea a lui Karl Knöpper.

Colecția de minerale a baronului Samuel von Brukenthal număra, în perioada în care Carl Eder a fost custode, 2018 piese, majoritatea de proveniență transilvăneană. Colecția s-a îmbogățit de-a lungul anilor, dar cea mai valoroasă achiziție a fost colecția consilierului tezaurial Johann Michael von Rosenfeld (1771–1837), în care sunt reprezentate toate zăcămintele transilvane. Neugeboren a realizat și catalogul colecției (manuscris aflat la Biblioteca Brukenthal).

Locația și apartenența colecției au cunoscut modificări de-a lungul timpului. Conform testamentului baronului Samuel von Brukenthal, după decesul ultimului vlăstar masculin al familiei – Hermann von Brukenthal – în 1872, colecțiile au intrat automat în posesia Bisericii Evanghelice. Originar unită cu celelalte colecții, colecția de minerale a fost predată în anul 1923, de către conducerea de atunci a Muzeului Brukenthal – cu menținerea

dreptului de proprietate – „Societății Ardelene de Științele Naturii”, pentru muzeul acesteia. Colecția a fost mutată la Muzeul de istorie Naturală. Ulterior, în conformitate cu Decretul 176 din 3 august 1948 pentru trecerea în proprietatea statului a bunurilor bisericilor, congregațiilor, comunităților sau particularilor, patrimoniul Muzeului Brukenthal a trecut în administrația Ministerului Artelor și Informațiilor. În acest fel și colecția de minerale a baronului a ajuns, în 1957 din nou la instituția „mamă” scriptic, dar faptic a rămas în depozitele muzeului. În prezent colecția se află în proces de retrocedare (Decizia nr. 614 din 21 noiembrie 2005), alături de întreg patrimoniul Muzeului Brukenthal către Biserica Evanghelică, proprietara de drept a patrimoniului fundației Brukenthal îmbogățită de-a lungul timpului de trei baroni.

În prezent colecția mineralogică a baronului Brukenthal se află la Muzeul de Istorie Naturală din Sibiu și numără 3.622 eșantioane. Este de fapt colecția baronului la care s-a adăugat colecția de minerale a Consilierului tezaural Rosenfeld. Catalogul colecției Rosenfeld a fost întocmit, iar colecția aranjată sistematic de către Neugeboren.

Colecția se păstrează așa cum a aranjat-o Neugeboren și anume împărțită în șase grupe (după sistemul renumitului mineralog și cristalograf Weiss): Pietre oxidice (718 piese), Pietre salice (775 piese), Minereuri oxidice (304 piese), Metale sulfuroase (1.129 piese), Metale native (526 piese), Inflamabile (3 piese).

În ceea ce privește aria de răspândire geografică, eșantioanele aparțin în majoritatea lor teritoriului României, provenind din „Patrulaterul aurifer” al Munților Apuseni (Săcărâmb, Baia de Arieș, Măgura-Toplița, Băița Crăciunești, fașa Băii, Techereu, Roșia Montană etc.), Munții Trascăului, Masivul Poiana Ruscă, zona metalogenetică a Băii Mari, arealul Moldova Nouă-Oravița-Dognecea (Banat), zăcămintul Rodna etc. Eșantioanele achiziționate din străinătate sunt mai puțin numeroase și aparțin unor ocurențe din Ungaria, Cehia, Slovacia, Serbia, Austria, Elveția, Italia, Norvegia și Rusia.

Colecția de minerale a baronului, extinsă după moartea fondatorului, are astăzi o mare importanță științifică, istorică și muzeală. Ea este dovada palpabilă a preocupărilor și cunoștințelor despre natură, a generozității acestui precursor al cunoașterii sistematice a mediului înconjurător, ca premiză a protejării lui.

MUSEUM PEDAGOGY

THE MUSEUMS – SPECIALIZED ENVIRONMENTS REGARDING THE TEACHING SYSTEM

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Abstract: The culture represents an important factor in which concerns the social, community and life quality development.

The museums are the main factors in the process of stimulating the cultural success and also the cultural phenomenon regarding all the local communities, due to their contribution in terms of storage the national cultural patrimony.

Since the culture has it's own contribution at the society and human personality building, she must be seen as a lifestyle – element of differentiation and a social bounding.

There also must be taken into consideration that fact that, the culture is being perceived as the expression of identity and diversity stake, important values that must be acquired and supported through approaches and pro-active programs, including the museological educational ones.

The education of people in the way of gaining a better knowledge of the museum's patrimony, must be the main concern of nowadays cultural romanian society, because cultural knowledge is essential for a proper self-development of the children, teenagers and adults. For this particular reason, the education should definitely become an important part in the general progress of each youngster, representing one of the primary aspects in their educational process.

The access and the participation at culture constitute cultural fundamental rights, acknowledged as that by all European countries.

The participation at the cultural act represents an important part in which concerns the social integration, the romanian museological strategy should provide, in this respect, the educational capitalization of the cultural potential and the movable, immovable and immaterial heritage.

Keywords: non-formal education, shadow theatre, European Volunteering Year.

Dynamism along with continuous upgrading are the nowadays society most valuable features. This whole new society can be recognized and appreciated only through a series of personal interpretations, which can be described as being, in most of the cases, variable, subjective and symbolic. From here develops the necessity of creating new and capable individuals who will gain the necessary skills, so that after a complete training, they will be able to analyse concrete and new matters and also to have the capacity to give a full, logical, critical and litigious answer to each issue that occure in their field. Therefore, it is a must for the new generation to develop the necessary abilities, which will help them enhance their way of adapting to new and unpredicted situations.

The Romanian teaching system has the tendency to become a modern one, following the European example which focuses on capacities and competences. The main characteristic

of such a teaching system is that it does not take full advantage of the fundamental process of memorizing, instead it develops them with logical memorizing of the facts, in order for students to have the ability to cope better with the data and also with the basic knowledge. The thinking operations, the behavior, the cognitive abilities, attitudes, all of this are evolving and developing in terms of solid basic knowledge, well structured.

All teaching systems from Romania and not only, concentrate on more theory and less practice. The school is supposed to represent one of the essential institutions among the educational system and its main formal teaching methods should be improved with a mixture of non-formal and informal education. The fine line between these three forms of education is the theoretical one, in practice, all of them, united, should work as a whole, which will definitely make it difficult for us to determine each one individually. Moreover, lately we are taking part at the formalization of the non-formal education, which seems to be approaching the school more and more.

The non-formal education does not include herself among a prototype of organization, but it involves, in general, cultural institutions (museums, theatres, libraries etc.), non-governmental organizations and other institutions which have in common the culture and education. Thus, this particular type of education has the possibility to reach a whole new level by using whatever represents a positive source from those mentioned above.

Occidental European teaching system has also made working with children and youngsters in areas dealing with the patrimony, as one of its main priorities. Due to the patrimony's infinite background information along with its aesthetical side, it can permanently stimulate this category of individuals to a more approachable way of digesting the information.

Through the non-formal education sustained by the museum's policy, this cultural institution offers a large variety of suitable social experiences useful for each category of age, bringing a new meaning to the concept of education, by promoting: a better organization of student's free time, new opportunities based on offering innovative life experiences for those involved in such programs (flexible and opened framework, diversified learning environments, volunteer, individual and collective participation at lessons and not least, flexible ways or properly answering to students interests), each student possibility of freely choosing which activity suits him best, the development of lifetime competences and also the process of turning students into active citizens.

Besides the information and competences typically for certain fields which include non-formal museum projects and activities, the students get the chance to develop organizational, self-administration, time managing, critical thinking, decisions making and also solving problems abilities. The museum can also be described as being practice and improvement field of various proclivities, skills and capacities in the areas which concern: the painting, trade art, music, theatre, teaching, PR and also safe way of enhancing the common sense of beauty.

In nowadays society, the museums have gained popularity in matters of teaching methods, due to the fact that the actual teaching process is efficiently stimulated through: the assimilation of a new package of knowledge and also a touch of creativity. The purpose of such an activity still concerns the well-being of students in the way that, by having free access to the museum's patrimony, they can relate the information received at school with something more tangible. It is also important to mention that, with involvement of the museum among the teaching, it is being emphasized the artwork potential of the patrimony and its extraordinary capacity of intriguing the intellect and also the human sensibility with the purpose of making sure the youngsters pay actual attention to the true values represented by the patrimony and that they manage to shape a proper moral, cultural and civil profile.

The school – as an institution – has responded to new social challenges through the enhancement of the activity area and the initiation of partnerships contracts with the civil society, local community or different other cultural institutions. Therefore, these two institutions – the school and the museum – can mutually support each other and the activities performed by them cover a wide range of information.

As a conclusion, raised from the innovating process of making this two (the school and the museum) work as one, the non-formal education can be complementary for school (formal education) through different methodological approach, but it is particularly difficult to work in a non-formal environment with those formed in a formal one. Here must be created a common path between them, in order to avoid complications and for things to work out smoothly.

Within the formal – non-formal education collaboration, the methods used by the formal one are not attractive at all for the public and they must be upgraded, the education of the parents being essentially regarding the evolution. On the other hand, there are few teachers willing to do something else beside their formal curriculum, so, as a matter of fact, for things to work out as expected, it is necessary a national level training for the teaching staff through the initiation in the curriculum of non-formal educational methods, which can be made possible only with a reform among the system, including the required specifications concerning non-formal education which has got standard teaching purposes (at present time, there is no such thing as structured data for non-formal education). In order for those who are in favor of the formal education to get involved with the non-formal concept and also for a better understanding of the process, they must familiarize with the methods used among the non-formal teaching. It is important for the teachers to permanently stay in touch with the activities hosted by the museum, because otherwise, they will consider this institution as a competitor for student's education, which is totally not the case. By taking into consideration the true intentions of the museum, there will be created a bounding between it's cultural purposes and the traditional didactical methods embraced by the school.

In the museum, among the programs/projects, can be used non-formal educational methods such as: workshops, theatres (including shadow theatre), volunteering, games, teamwork for projects, camps, radio shows, online games on museum's websites, educational training, groups for those with disabilities, afterschool activities, summer/winter school or camps, seminars, carrier perspectives and many others.

The programs and projects specialized according to group ages, through a series of conventional methods (exhibitions, editorial production-catalogs, children books, monografies, mini productions which include lines from the museum's patrimony most important slogans, sold as souvenirs, etc) or less conventional ones (virtual museum IT, projects with the involvement of other educational public or private institutions, organizations from abroad) are meant to come as an answer to the diversified market demands. Such a thing can reach it's purpose by publishing on sites, specialized didactical offers, giving those interested (youngsters, parents, teachers) all the information needed about the alternatives of formal education. It is advisable for museums to permanently and directly collaborate with the schools and to conclude partnerships with universities, including as a statement the fact that, each institution should have among their license themes, ones which deal with the intense studying and the capitalization of one of the museum's collections, regardless the university's main educational field.

The cultural patrimony from museums should be present in the teaching curriculum, as well as in the academical one. Individual study themes having as research purpose communication and comparison (a patrimony object, a collection, a museum hosted activity, a professional selected group of people from all the museological institutions) should be found as homework

in all student's books. These individual themes, once required by the teachers as didactical curriculum assessment, would have the following results:

- 1) student's individual or group work abilities development, concerning an outside the class, laboratory, library, school, internet, objective, stimulating the analysis and synthesis spirit;
- 2) freely students participation at a precise event from a well determined point of view and as a step towards the achievement of a original material which will also be revealed in front of colleagues and parents, represents a dynamical alternative opposed to the passive watching of a preamble during a visit imposed by teachers, school, family;
- 3) the direct contact of students with the museum makes them conscious of the specificity and unicity of the national cultural values, maybe helping them to better understand their importance and to do their best in order to protect them.

In the last year, there has been registered an improvement in which concerns the collaboration between the school and the museum, like the following example.

The Romania's National Art Museum which has an experience of ten years in creating and implementing educational programs for all range of students and also for families and adults, tries to convince the schoolteachers and teachers to change the classroom environment with the museum vibe when it comes to matters of drawing, history&literature, geography, biology, mathematics, religion and many others.

From this point of view was created the training program for the didactical staff, called "The non-formal education in museums" organized by "Casa Corpului Didactic București" in collaboration with Romania's National Art Museum, accredited by "Ministerul Educației, Cercetării, Tineretului și Sportului România".

The designation of this program is to turn the museum into an educational resource and to encourage the teaching staff to combine traditional teaching and learning methods with the non-formal ones, in creating a new approach of interactive interdiscipline. The success consist in the fact that none of the lessons have something to do with the other ones, thereby with the repetition of the same idea but said with different words, and the course schedule created in such a way that it appeals attractive to the students. The structure of the program which appeared in 2009, has included courses of museological education theory, art history, educational games and also practical activities hosted by the museum. The practical part is extremely important and has the role of illustrating the discussed themes and to help the teaching staff familiarize with the museum as a new educational environment. The educational notions and teaching techniques, along with art morphological elements, are being applied to the museum's patrimony and it can be adapted to any other museum. As main goals achieved during this process, we must take into account the practice of didactical transdisciplinary skills, the capitalization of a new environment for students, the familiarization of didactical staff with the concept of museological education, including the basic methods used by the institution and also the assimilation of innovating techniques which are dealing with special games. The necessity of creating such a program has developed due to the present teaching changes based on transdiscipline and interactivity. The increasing interest of students and families for museological education, simultaneously with the evolution of the modern concepts, contributes to the necessity of training specialized didactical staff able to give students another educational alternative, as a completion of the curriculum and of the lessons taken place at the school headquarters.

Coming back at the concept of non-formal education, there must be stipulated that this particular type has got an interdisciplinary tackle, with the existence of the ludical aspect. It's usage in museums must not be reckon as only ludical museological education, but also as being

a form of didactic which tends to focus on active teaching methods, with an equal to equal approach. Another aspect which requires maximum attention is the one dealing with the fact that the museum teaching staff, through its mission, becomes a model for those involved and for that, it is recommended a serious and decent attitude towards situations that imply a straightforward or roundabout dialogation with the public, especially with the young one, who is the most vulnerable when it comes to the power of example (positive or negative).

Even though the museological education is being focused at the moment on youngsters, it is primordial to create activities for adults and old people, that increases a wide range of competences. This is being perceived as a huge challenge for specialists because it is extremely difficult to catch and maintain this sort of audience attention, especially when it comes to turn it into a loyal one.

The public-private partnership seems to be very beneficial, because it facilitates the development of the museological education and its usage among non-formal criteria. Thus, the involvement of such associations must reach the local communities, mostly the rural areas, where the existence of non-formal ways of teaching could help students improve their competences and abilities, taking also into consideration that there are fewer museums in here, that in a town, for instance. The private area of education give credit to the non-formal field, in which companies are willing to invest, mainly for publicity.

Another viable and practical example, this time among associations, could be the “Lut Ars” 2010 project, initiated by “Gaspar, Baltasar & Melchior” association, guided by the married-artists couple, Adriana and Virgil Scripcariu, who were involved in a series of research actions, which have as a main purpose the inclusion of the patrimony into children’s interests. As part of the project and with the support of “Administrația Fondului Cultural Național” was printed a brochure meant to sum up a few ONGs experiences in the last years.

Volunteering at museums should definitely be encouraged, due to the fact that it represents a valuable source of education and an efficient method of recruiting future specialists in collecting, studying and promoting the museum’s patrimony. This could be a national level achievement, on the long or short term, through which it could be created a path to accessing european funds for various projects dedicated to students interested in volunteering at the museum, considering that, 2011 is the “European Volunteering Year”. By training volunteer students interested in culture and museum’s patrimony as specialists, it could be assured the necessary number of specialized staff for this particular institution (which is facing at the moment an issue regarding the lack of competent museologists and researchers) able to take over the activities concerning Romania’s museum cultural patrimony. For students, such an effort may appeal as attractive, taking into consideration that volunteering at a museum while academical education, gives them the opportunity to specialize in different research areas and even maybe, consider this environment as a possible future job.

Facing the lack of staff, the museums should do their best in order to highly motivate those involved in volunteering, to let themselves be trained in such a way that, in the future, to follow a museological career. Therefore, the volunteers training and management becomes a priority. Those who participate at the museum’s activities as volunteers, should benefit of logistic support, free access to the library and the data, where possible and also to get involved in the projects hosted by this institution. In the process of their motivation, it must be taken into account the opportunities regarding the collaboration with various cultural personalities and ways of including their contribution into the projects. Also, by offering the participants, at the end of their trial as volunteers, a certificate, could stimulate and rush their official enrolment as actual volunteers, especially if their internship would be recognized as specialty practice.

To sum up, all museums from Romania should focus their attention upon expanding the connection with the public and giving more importance to the concept of “entertainment” among the museum. For this reason, *the PR* in museums from Romania could create an *emotional bounding* with the public, which, in time, to be turned into an efficient communication. The relationship between this two must work from both perspectives, be cheerful, dynamical, and to be applied the concept of “vice versa”. To fulfill such a thing, museums from abroad are putting into practice this method from a long time ago, through museological specialized teaching staff, who is constantly testing the public’s interest, divided by group ages, professions, ethnies, in terms of the educational-cultural idea promoted by the museum, so that, it can be taken into account a large number of parameters and stipulations of time, interest, preferences, groups, work schedules, free time and others.

Along with the museologists and the teaching staff, there is a whole new range of specialists forming at the museum from Romania, where the department of education is being more and more revised. The task for this specialists is far by easy, but, if they manage to understand and assimilate with devotement the role of educator, and specializes on this fields (including taking pedagogical and psychological courses), will definitely succeed in becoming closer and closer with children and youngsters.

The Romanian museums must learn how to host the new generation, by following the occidental pattern, mostly that from the US and Canada where the museums have turned into a encountering and spending time environment for families with children of all ages, but also for teenagers and old people, where the museum’s educator (who is part of the exhibition organizational team) is being questioned and consulted with every issue regarding the institution. This is why, such museums have the possibility to produce enough income to ensure their existence and development and to compete for people’s attention with the other forms of entertainment.

By taking all of the above into consideration, it is a must for Romanian museum’s PR education to have such a department and it should be a belonging desideratum for each and every cultural managers who produces museological institutions, dealing with certain fields such as: art, history, arts and natural sciences. This museums should be active partners for the teaching system of each level offering the possibility of experimenting and developing study of each area, but also stimulating the community’s approval in becoming an active part of their life.

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MUZEELE – MEDII ÎN PROCESUL DE ÎNVĂȚARE

(rezumat)

Lucrarea urmărește să surprindă rolul educației nonformale în viața muzeelor, *in extenso*. Definind educația nonformală, lucrarea explică interferența celor trei tipuri de educație: formală, nonformală și informală, prin marcarea rolului școlii și al muzeului și prin sublinierea importanței parteneriatului școală-muzeu.

De asemenea, se are în vedere descrierea contextului educațional actual în care muzeele intervin ca medii de învățare, enumerarea diverselor metode de educație nonformală pe care muzeele le pot folosi în proiectele/ programele de educație muzeală, precum și o propunere a modului în care patrimoniul cultural s-ar putea regăsi în programa școlară și preuniversitară, cu exemplificarea potențialelor efecte ale introducerii acestor instrumente didactice asupra educației elevilor și studenților.

Programul de formare pentru cadre didactice *Educația nonformală în muzee*, organizat de Casa Corpului Didactic din București în parteneriat cu Muzeul Național de Artă al României (MNAR), program acreditat de Ministerul Educației, Cercetării, Tineretului și Sportului din România, este propus ca model de bună practică. Scopul programului este utilizarea muzeului ca resursă educativă și încurajarea cadrelor didactice să completeze metodele de predare și învățare tradiționale cu principiile educației nonformale și o abordare interdisciplinară și interactivă.

Motivarea pentru afirmația potrivit căreia, parteneriatul public-privat este foarte util în atingerea obiectivelor privind dezvoltarea educației muzeale și folosirea educației și metodologiei educației nonformale, este un alt exemplu de bună practică, și anume, proiectul Lut Ars 2010 al Asociației Gaspar, Baltasar & Melchior, condusă de soții-artiști Adriana și Virgil Scripcariu, ce s-au implicat într-o serie de proiecte de explorare, care au avut drept scop aducerea patrimoniului în atenția copiilor.

Încurajarea voluntariatului în muzee trebuie văzută ca sursă importantă de educație și ca modalitate eficientă de a recruta viitori specialiști în colectarea, studierea și promovarea patrimoniului muzeal.

În concluzie, lucrarea recomandă ca legătura dintre muzeu și public să fie permanentă, să funcționeze în ambele sensuri și să fie caldă și atractivă, iar fiecare serviciu oferit să se afle în concordanță cu segmentul de public căruia i se adresează pentru a preîntâmpina așteptările comunității.

De asemenea, în lucrare se dorește definirea rolului educatorului de muzeu și a departamentului specializat în educația muzeală din cadrul fiecărei instituții muzeale, în contextul mai larg al cerințelor educaționale în societatea contemporană.

THE NATURAL HISTORY MUSEUM FROM SIBIU – THE EDUCATIONAL PROJECT *MY HERO FROM NATURE*

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Abstract: The Museum of Natural History from Sibiu through its educational activities promotes environmental education as a central aspect of the process of change towards sustainable development. Environmental education creates enthusiastic students, innovative teachers and inspires all the participants to respect nature. One of these projects *My Hero from Nature* was initiated at our museum in 2011, the length of the project was of three month (February to April). Each month was dedicated to one animal from our Romanian fauna. The main objective of the project was to offer the students positive role models from the animal world, examples of power, strength, impressive adaptation skills and at the same time introduce new notions related to these animals morphology, habitat, ethology and why it is necessary to protect them. At the project participated over 1000 students from 11 educational institutions from Sibiu County who signed up for 55 activities held by two museum curators, who also coordinated the project Mesaroș Ana-Maria and Cuzepan Gabriela.

Keywords: environmental education, educational project, natural history museum.

Introduction

Today more than ever, society needs high-quality environmental education programs that succeed in moving values and changing behaviours in the direction of sustainability and environmental conservation. Environmental education is often lauded by educators as an ideal way to integrate classroom curricula, stimulate the academic and social growth of young people and promote the conservation of the natural environment. Each year the Natural History Museum from Sibiu promotes a series of projects based on environmental education. The projects have different themes and notions and are held by the museum staff according to their area of expertise. Objectives of environmental education demand more challenging learning outcomes, the existing classroom practices need to be supplemented with more innovative and participatory techniques, and that is why the Natural History Museum is the perfect place to implement different techniques. It is erroneously believed by common people that environmental degradation includes only pollution, cutting of trees, use of non-bio degradable materials and killing of animals. It is also wrongly perceived by majority of us that individuals can do very little with regard to protection of environment and that the responsibility for the same lies either with the Government or with the organisations specially established for this purpose. Many students do not know and understand that little actions on the part of individuals and groups can make

significant contribution to the protection of environment. It needs to be brought to the students' attention that maintaining environmental health begins from them.

In 2011 the museum launched a new educational project named metaphorically *My Hero from Nature*, coordinated by Mesaroș Ana-Maria and Cuzepan Gabriela. The starting point of this project was that our current society has a few role models for our young generation to follow. A child with a role model is more likely to be inspired and driven to achieve his or her goals, than a child without one. Having a role model opens up our minds to possibilities we otherwise thought were far out of our reach. Each generation has its role models, which represents them. If we ask a first grade student who is his hero, he will say that a cartoon character with super powers and if we ask a teenage student he will say an actor or singer. None of these are, in many cases, true role models.

Nature has his heroes and through this project we attempted to reveal the secret aspects of the animals, which make them unique. During history, human kind has admired animals, transforming them in to religious and power symbols and included them in art and literature. We even reached that point of killing them for their body parts believing that if we consume or wear them then we will have the same qualities as the live animal possessed. Unfortunately many times, these impressive creatures have been hunted because of their attribute or because for us it was hard to understand their adaptations and today they are endangered.

Nature through its diversity and dimensions offers examples of courage and power, strength and survival, true role models for each and one of us.

The major learning outcomes of the project were:

1. To improve awareness about environmental concerns;
2. To develop understanding of animal life and behaviour;
3. To arouse concern for animal protection;
4. To stimulate commitment for environmental protection;
5. To demand action to promote conservation of animals and their habitats.

The activities developed during the project were not meant to be prescriptive. Instead, these were suggestive and cut across not only through content areas of different subjects but also curricular activities and other programmes of the schools. The teachers were suggested to design similar activities to suit their locale-specific situations and achieve the desired results.

Materials and methods

During other educational activities performed by the project coordinator they observed that if asked what is their favourite animal the children would give exotic examples like lion, tiger, exotic poisonous reptiles and spiders, but none of them mentioned an animal from the Romanian fauna. Romania's fauna was and still is one of the richest and most varied in Europe, boasting some rare and even unique species on the continent. Although Romania is rich in biodiversity, the country has undergone a progressive loss of biodiversity as a result of human activity. Children from a young age must learn to respect our country natural habitats and to protect the wild fauna and flora. The scientific mission of our Natural History Museum is set by its one profile: the study of biodiversity through research on the collection and transfer of scientific knowledge to the public, aiming to educate while spending enjoyable free time, the spread of knowledge regarding the Romanian natural heritage, raising awareness of current issues related to environment, species and habitats.

That is why the project coordinators decided to appoint for each month an animal present in our natural habitats: for February the Bear (about 60 % of the total European brown bear

population lives in Romania), March was the month of the Wolf (about 40% of the European wolf population occurs here) and April the month of the Owl (superstition “victim” and subject of myths and legends).

After setting the general themes for each month an analysis of what should include a practical activity was necessary, following the general steps [3]:

- a). The preparation, type and structure of each activity;
- b). The content of each activity;
- c). The methods of education applied;
- d). The role and attitude of the museum staff;
- e). Self evaluation of the coordinator and general evaluation of each activity;
- f). General observations regarding the activities (the level of understanding of the participants, the attitude of the teachers towards the project).

During the preparation stage materials regarding the three animals were gathered from the museum library, internet sources and our museum written hand guides [1, 2], making it thus easy for the participants to procure the material for their one library and future studies. Experience from other educational projects showed that children respond better to visual (power-point presentations, short scientific documentaries) and practical methods of communications that is why each activity included methods and techniques designed for these learning methods. For each month an activity followed three steps:

- In the first step the participants should become familiar with the animal in subject,
- The second step implies the structuring of the information acquired during the first step by practical written exercises or interactive worksheets and by a visit in the museum general exhibit where they can observe the real animal;
- The final step or the use of the new information acquired, when each participant should be able to specify why the animal and its habitat should be protected, its role in nature and what are the causes of the decline in number of the specimen and how can he or she prevent them.

The project coordinators divided equally the documentation responsibilities and for each month a package containing: a power-point presentation, interactive worksheets and scientific documentaries were elaborated and procured. The project was developed for a wide range of students, of every age, starting from the first grade and finishing with high school students. To meet the requirements for each category of age and the school curriculum the coordinators divided the tasks and for each month were prepared materials specific to the participant's level of preparation. The power – point presentations had the same structure from one month to the other so that the children could visualize and memorise better the information.

The duration of one activity was set at two hours with the possibility to reduce the quantity of material at the request of the teachers. The fee for each participant was set at 2 Ron, the general entrance fee for children at our museum.

After establishing the general guidelines for each month at the end of January the project was advertised using the Brukenthal Museum web page (<http://www.brukenthalmuseum.ro/educatie/index.html>) where for each month of the project Dana Roxana Hrib elaborated interactive and exciting power – point presentations, the main source for information dissemination was the Natural History Museum blog administrated by Gabriela Cuzepan (<http://naturalmuseum.wordpress.com/educatie/>) which proved to be also the most effective method combined with mailing and oral presentations of the upcoming project to the teachers that already attended our museum's educational activities. The museum edited a poster (Fig. 1) that stood outside, for everyone to see, for the entire project, thus reaching the general public, mostly the parents, who in many occasions are the ones who encourage their children teachers to attend extracurricular activities.

Each teacher that wanted to participate in our educational project had to send an email of interest and in return she received a general description of the activities and the worksheets, so that she could decide which one was more suitable for the level of preparation of the children and which conquered with her current school curriculum.

After reading the general presentation of the project for that month the teacher sent the selected worksheets and the date and hours when he or she would like to attend the activity. Each request was then entered in the project database, which included the following sections: a current number for the entry, the name of the teacher, the educational institution that he/she represented, the class grade, the number of participants, which activities the teacher choose (power-point presentation, worksheets and visit in the general exhibit, scientific documentary).

The entire process of environmental education involves a wide range and variety of learning awareness and understanding: sensitivity, concern, responsible choice, willingness and commitment to action. All these qualities, obviously, cannot be provided through one single source or method. The coordinators had to draw from a wide range of learning resources and employ a variety of techniques, singly or in combination, to take the learners nearer to the set goals.

The teaching techniques selected for the project ensured maximum involvement of the learners and provide enough opportunities for students to experience the simulated environment. Studies on cognitive development reveal that student participation is a key to success in learning that is why the children had to resolve the animal general aspects worksheets which structured the information presented by the museum curator during the power-point. In general the project included for each activity learner-centred activities:

- Learning-by-doing the general aspect of the animals worksheet and learning common names of the animals and their habitats worksheet (Fig. 2 a/b/c, 3);
- Group discussions at the end of each power-point presentation;
- Games provided by the masks that they had to colour and cut (fig.4);
- Problem solving the maze worksheet (Fig. 5 a/b);
- Inquiry approach, the museum curators responded during the power – point presentations to the children questions and at the same time encouraged them to respond and participate at the discussions.

These techniques brought about maximum learner participation. Through active participation learning becomes internalised and part of learner's cognitive structure, Piaget's theory of cognitive development and Bruner's theory of concept formation support these beliefs [3].

Results and discussions

The project, from our point of view, was a success:

- February, the month of the Bear, the activities were attended by 442 participants from 5 educational institutions from Sibiu County ("Octavian Goga" National College, The General School from Orlat Sibiu County, School number 18 from Sibiu, School number 8 from Sibiu and School number 10 from Sibiu);
- March, the month of the Wolf, there were 389 participants from 9 educational institutions from Sibiu County ("Gheorghe Lazăr" National College from Sibiu, "Octavian Goga" National College from Sibiu, The General School from Orlat Sibiu County, School number 18 from Sibiu, School number 8 from Sibiu and School number 1 from Sibiu, School number 25 from Sibiu, School number 2 from Sibiu, School Centre for Children with special needs – CSEI Centrul Educational pentru Educație Incluzivă – number 1 from Sibiu);

- May, the month of the Owl, 258 participants attended the project from 6 educational institutions from Sibiu County ("Octavian Goga" National College from Sibiu, The General School from Orlat Sibiu County, "Gheorghe Lazăr" National College from Sibiu, School number 8 from Sibiu, School number 25 from Sibiu, School number 2 from Sibiu).

Unfortunately there were only a few teachers who came during the entire educational project because, as they specified, they have difficulties in bringing the children on the streets from the school alone, the general schedule, the hour when she or he was appointed was not satisfactory, other educational projects that were ongoing occupied the space and the weather was also a negative factor. But the outcome of 55 educational activities, over 1000 participants from 11 educational institutions was positive.

In general, teachers participated actively even preparing the children at class. Some classes prepared their one presentation of the animals, on cardboard drawing the animals and writing information related to the description, habitat and habits of the animals. They had to present these cardboards in front of their class mates encouraging their speech. Working in teams to come up with the cardboards made them more open to their colleagues personalities, accepting and encouraging one another when they had to present their work.

Associating bellowed objects like toys, children stories or cartoon characters with the animals had a positive impact. At the beginning of each power – point presentation the museum curator included bear, wolf or owl cartoon characters creating a relaxed and friendly learning environment for the children. All so when they were asked why these animals were loved cartoon characters the children found numerous examples of qualities associated to them that make these animals true "heroes" from nature. For example one teacher Vasile Crina from the "Octavian Goga" National College from Sibiu asked the children to bring to the bear month activities their Teddy bears. The museum curator responsible for that activity included in the presentation the history of the teddy bear and what it stands for, the toy being a symbol, explaining to the children that the efforts to protect bears are not just a present day issues. Associating bellowed objects like toys, children stories or cartoon characters with the animals had a positive impact.

The children transformed colouring and solving their worksheets in to a competition. From one activity to the other they were competing which one would know to respond to more questions and so they searched on their one spare time information related to the animals, encouraging self – learning. Some of the teachers were amazed with the response of the children and their work during the activities because at school they did not show the same interest. For example because of her hard work at our museum activities one of the participants received from her teacher Marcela Bratu ("Octavian Goga" National College) a better grade at school.

To self evaluate their teaching method the coordinators asked at the beginning of each activity the participants a few questions related to the last time they were at the museum. As the power – point presentations had the same structure for each animal, when the children would learn about a new animal they were asked questions to see if they understood and memorise the information from the previous lesson, and thus learning by comparison.

Our museum general exhibit holds in the section dedicated to birds eight species of owls. The children after completing the owl species work sheets were asked to go in to the exhibit and identify them by their common names, of course holding their worksheets. At the end of the exercise all of the children could name at least two species of owls from the Romanian fauna.

Conclusions

In order to ensure survival into the next century, museums must demonstrate their social relevance and use by developing their public service functions and becoming more knowledgeable about the needs of their visitors and more adapt at providing enjoyable and worthwhile experiences [4]. Education as a crucial museum function has been recognised as long as there have been public museums. Studies of learning style reveal that every student has a preferred learning style which facilitates and enhances his learning. Different methods of teaching are necessary to maintain student's interest and increase their desire for further learning. No matter the age they all show interest and are willing to participate in museum educational activities. The Natural History Museum from Sibiu through the educational project *My Hero from Nature* developed its educational functions towards a sustainable society. The project involved the participation of over 1000 students from 11 schools from Sibiu County in only 3 months, significant numbers in comparison to other museum educational projects (for example an educational project dedicated to the primary school was attended by 3060 participants during the entire school year 2009–2010).

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MUZEUL DE ISTORIE NATURALĂ SIBIU – PROIECTUL EDUCAȚIONAL *EROUL MEU DIN NATURĂ*

(rezumat)

Muzeul de Istorie Naturală din Sibiu promovează, prin intermediul activităților sale, educația ecologică. Educația ecologică crează elevi entuziasmați, profesori inovativi și inspiră participanții la astfel de manifestări, să respecte natura sub toate aspectele ei. Unul dintre proiectele muzeului, inițiat în 2011, a fost *Eroul meu din natură*, care s-a desfășurat pe perioada a trei luni (februarie – aprilie). Fiecare lună a fost dedicată unui animal din fauna României. Obiectivul general al proiectului a fost acela de a le oferi participanților modele pozitive de urmat, eroi din lumea animalelor, exemple de putere, forță, adaptare și în același timp elevii să descopere noțiuni noi legate de morfologia, habitatul și etologia acestor animale, noțiuni elementare pentru a înțelege de ce este esențial ca ele să fie protejate. La proiect au participat peste 1000 de elevi aparținând la 11 instituții de învățământ din județul Sibiu, clasele luând parte la 55 de activități educaționale de-a lungul celor trei luni, activități susținute de coordonatorii proiectului Mesaroș Ana-Maria și Cuzepan Gabriela.

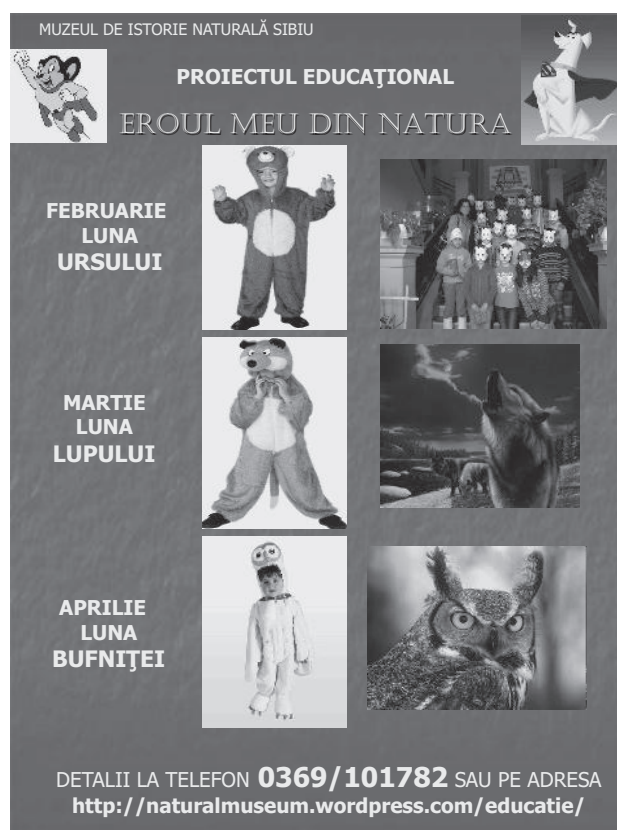


Fig. 1: The project poster

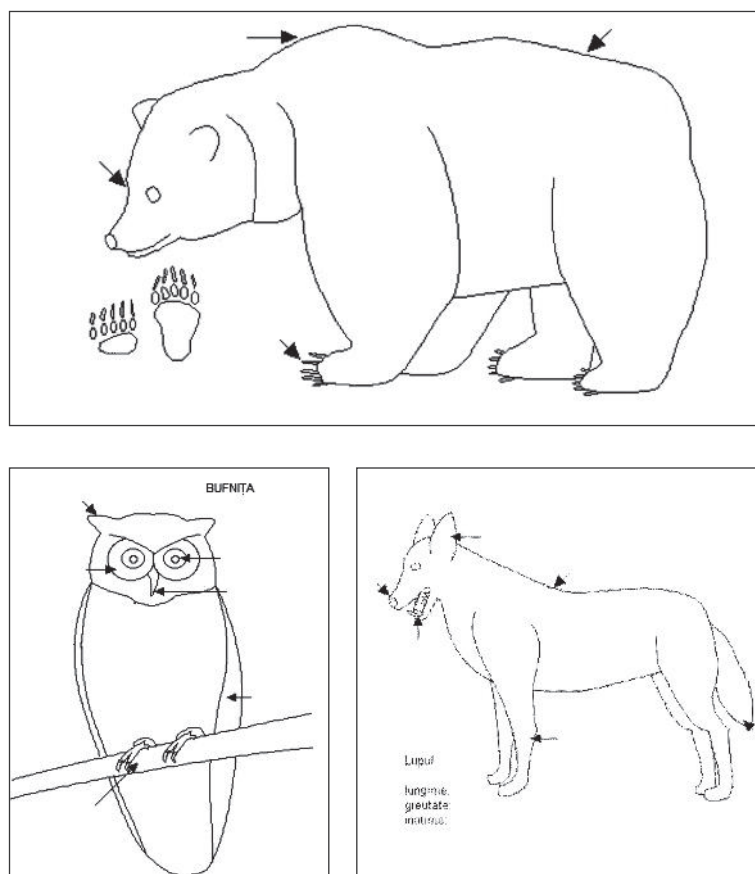


Fig. 2 a/b/c: General aspects of the animals – worksheets

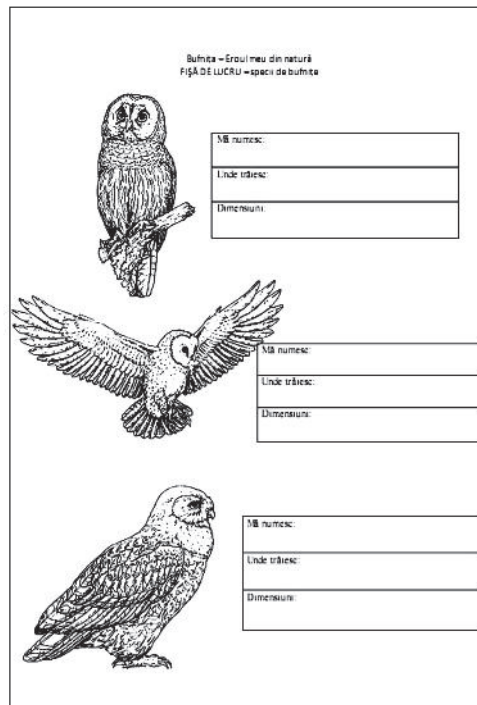


Fig. 3: Learning the owls common names and habitats worksheet

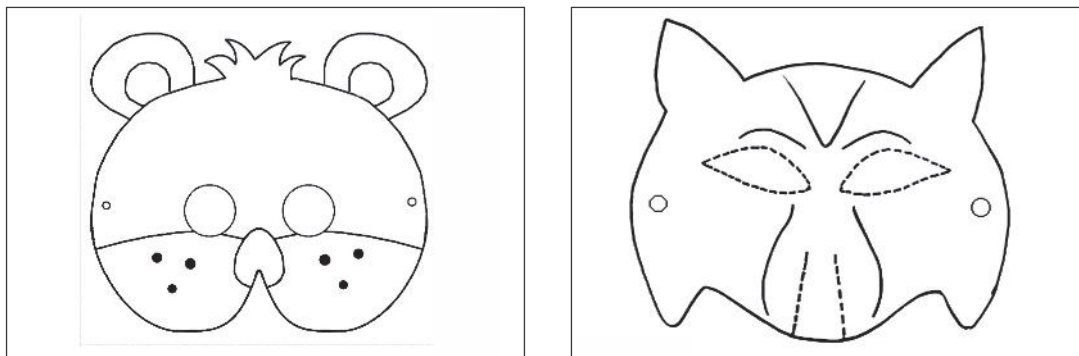


Fig. 4: Interactive game masks

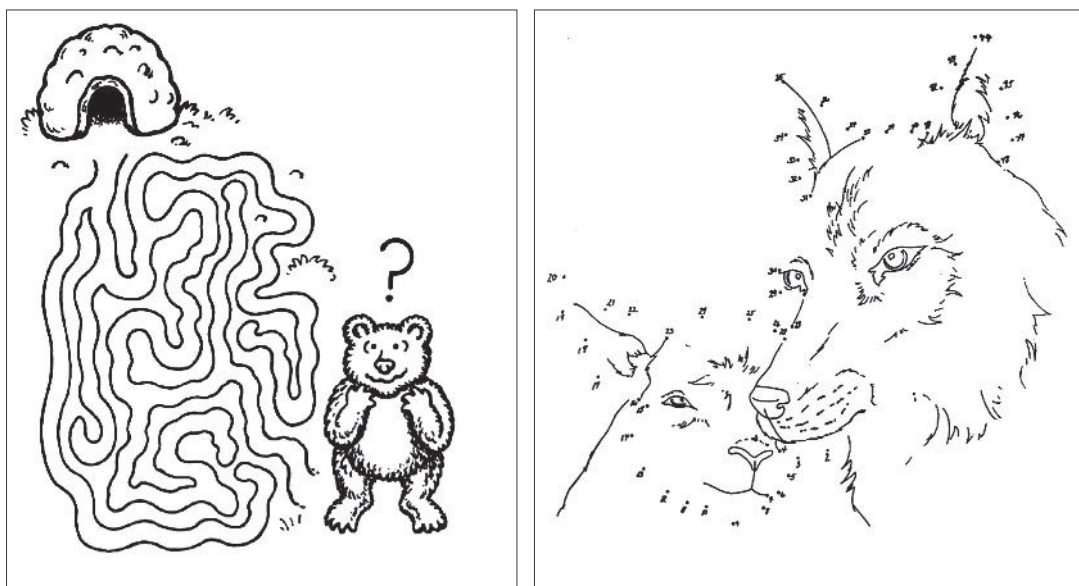


Fig. 5 a/b: Problem solving worksheets



Fig. 6: Images during the project activities

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